

Australian Personal Computer

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inside

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"Our first preview of the 2nd Australian Personal Computer Show, Europe set to become the semiconductor battlefield of the world, Pascal introductory course to be broadcast on radio, is Adam Osborne back in business?, school raises \$12,000 in PC exhibition, DEC introduces multi-user system for PC, Apple vs Computer Edge — statements from both sides." Just some of the stories featuring in this month's news round-up.

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A micro offering built-in high speed storage, printer, 80k of RAM and wordprocessing software as well sounds too good to be true. But that's what Coleco's Adam promises. Brian Power gets his hands on one.



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Can a micro have a hard disk *and* be portable? We investigate the concept.



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*As the time for the 2nd APC Show looms up,
we present the first of several previews of Australia's foremost micro industry event.*

WONDERFUL THINGS

With only a matter of two months to go at the time of writing, preparation for Australia's biggest and best microcomputer Show is well under way.

Endless variety, a good measure of comedy, a drop of pure panic, several hundred fixed grins and a horde of whirring disk drives and bleeping micros will conspire to make the 2nd APC Show the tastiest silicon cocktail for some time (well — since last year's APC Show, anyway).

If you're not too straight-laced we hope you'll take some time off from databases and WPs and drop in on the games on display to be shot at by bristling aliens and get lost in dreadful caverns and castles for a while. And we also hope that boggle-eyed games fans will tear their sticky eyeballs off those nasty bright TV screens and meander into the serious bit as well — who knows, word processing could be the best game you've ever played . . .

Whatever your inclination, one thing is certain. You'll find something worth seeing and probably a lot worth buying as well. All the most up to date computer products and plenty of good old favourites will be vying for your attention.

Naturally the Show has attracted all the big boys and many of the interesting little ones as well. Some interesting product arrivals include Shugart's 3.5in disk which stores 1 Mb on each disk, the Texas Instruments speech recognition unit — so your micro can now respond when you verbally abuse it — also there will be the PCnet local area networking system for the IBM PC from Telecomputing PCS (IBM has yet to produce its own

micro networking system) which sells for around \$2,400 to connect two PC's and \$1,200 per additional PC.

New machines on display will include the Sharp PC5000 portable micro (of the intermediate kind. It's bigger than the Tandy Model 100 and smaller than a Kaypro — its closest relatives are the Gavalin and Australian designed Magnum); Sanyo's IBM PC work-alike called the

him on Microsoft's stand.

Now we're not promising anything, but IBM has released the PCjr in the States, Apple will have shown its MacIntosh in Australia by the time you read this (and announced a whole new family of 32 bit micros) and there's a lot of talk around the traps about imminent release dates of the Commodore 128 and Tandy's 80 column by 24 line LCD (true) portable, so it's quite on the cards the 2nd APC Show could see a huge number of new releases. In any event we

'in a couple of months'.

And since his company has gone through some troubled times since then, the delay isn't all due to getting it right.

However, it's here now, and (theoretically) no-one with a CP/M type system or MS-DOS family machine need load and run a series of different programs to do one task.

Here's what I mean: you are writing a message for transmission down the phone line. First, you must create it (on WordStar, of course) and then you must save it. Then you must load a program called PIP to message it into shape for transmission (it's called stripping off the high bits). Finally, you must load the communications program and type in a series of complex commands to direct output to the serial port, set the transmission speed, and transmit the file you have prepared.

Most people get at least one step of this wrong, even when they know what they're doing. Leave a note for an inexperienced colleague, saying 'please send a BTG message to Donald saying that we need the new part and you can guarantee not getting the part.

StarBurst is the way to leave the message. You 'program' it to load each program in turn, and to ask the inexperienced operator for the right inputs at the right time.

There is only one snag to this dreamlike scene: so far, StarBurst will load and run only MicroPro products. And unless they've sneakily launched it-between when I wrote this and publication, MicroPro doesn't have a communications package to send the message down the phone line.

And PIP isn't a MicroPro product, either.

But it will work with the database, spreadsheet, text editing, spelling checking and sorting programs from MicroPro, and that, as John Lennon said, that's a start.

Guy Kewney



The 2nd Australian
Personal
Computer Show
Centrepoin
Sydney
14-17 March 1984

MBC 555 which is claimed to sell for around half the cost of Big Blues PC; Hewlett Packard's HP 150 "touch screen" micro which won the "show stopper" award at Comdec 83 in the US; the Challenger (Dick Smith's very cheap IBM PC work-alike); a low end four terminal multi-user system from Televideo called the TS804 which will sell for around \$11k, including a 10 Mb hard disk and four terminals (excl. tax); and Barson Computers will have the Apricot and Electron on display.

We shouldn't forget to mention the increasingly popular rodent peripheral, the mouse. As predicted by Apple ("1984 will be the year of the mouse"), there'll be a veritable plague — even Bill Gates, head of Microsoft, will be out from the US to show us his. You can see

know this Show's going to be a great one. And as yet, quite a number of the exhibitors haven't told us what they've planned, so you're in for a lot of surprises. Whether you be a beginner, an enthusiast, a business user or an expert we can guarantee you will find plenty to interest you.

The 2nd Australian Personal Computer Show runs from March 14 to 17 at Centrepoin, Sydney (March 14 is a trade only day).

Burst of energy

Starburst is, however wonderful it may be, pretty late. It is well over two years since MicroPro boss Seymour Rubinstein (inventor of WordStar) told me of his plans to eliminate program loading commands

Taped

Once upon a time mass data storage meant magnetic tapes and thus the average access time was half the time taken to access every record on a file.

Files with high collation ratios were ideally suited to sequential filing methods and others better suited to Random Access Systems.

With the passage of time and the dramatic reduction in the cost of RAM systems, magnetic tapes declined in importance as a means of storing large files. That is they did in most commercial installations, with the government and its huge investment in magnetic tape

files things were and are different.

One of the Federal Government departments with enormous magnetic tape files is the Department of Social Service or DSS. With its move from a relatively old but hideously overworked IBM system to a mixed Wang, STC, Amdahl and others installation, the Department still had thousands of magnetic tape reels.

DSS therefore needed some way of automatically loading tape to reduce in some way the workloads of the Department's operators. These personnel at DSS have a history of almost unbelievable dedication

which under a previous government caused many of them serious health problems.

So it is with a certain pleasure it can be reported that the DSS has ordered seven automated magnetic tape reel loaders worth in excess of three and a half megabucks from Datamatic.

These systems from the overseas maker, Braegen, are intended to be an integral part of the DSS' new computer system. They consist of banks of storage units containing up to 8000 reels of magnetic tape. Each system is attached to a number of tape transports, up to a maximum of 32. A servo arm selects a required

tape reel and mounts it onto the relevant tape transport. This is performed under the control of the mainframe's operating system.

An automated tape library system, as it will be supplied by Datamatic, gives access to a maximum of one million megabytes of information with a claimed access time of around 60 seconds. Apart from the operation of the system under mainframe operating system control, a human operator at a remote terminal can request the automated tape library to load a tape on any drive using manual control.

The largest system will be installed in Canberra with smaller ones in Melbourne.

Everyone's peeking in windows

Texas hold 'em is what they call the game they play in the annual World Series poker contest held in Las Vegas' Horseshoe Club. This is big money poker, with as much as \$700,000 in a single pot by the end, when after days of play, things have come down to 3 or 4 of the very best, most ornery players with nerves of steel and very fat wallets.

1984's competition stands to be considerably enlivened, however, by the entrance of a player with nerves of silicon.

In a \$1 million challenge, poker writer Mike Caro, also known as the Mad Genius of Poker, is pitting his Pascal poker program on an Apple II against the best in the world. The game will take place at the Horseshoe during the regular World Series and will be one on one, freeze out, \$100,000 buy in, winner takes all.

The current champ, Tom McEvoy is in, so is two-time

champ Doyle Brunson, and the flamboyant Bob Stupak, alias the 'world's greatest player', has said he will bet \$1 million to beat the computer and he promises to give his Rolls to Mike Caro if he loses. Caro doesn't have a Rolls, so if the program fails this awesome task he will give Stupak a hammer and 'let him smash my computer in front of the whole world'.

Some things can happen only in America. Software news is the rushed announcement of Microsoft's Windows to go toe-to-toe with Visicorp's VisiOn in the rapidly intensifying windowing wars. VisiOn and Windows are radically different approaches, Windows being cheaper by far (\$250 maximum) and basically just an expansion of the environment of MSDOS allowing graphical applications, while VisiOn is a complete environment system requiring 2Mb of memory and offering Lisa-like capabilities.

Windows will face problems in attracting PC users because it cannot handle some of the popular 'misbehaved' software, such as Lotus 1-2-3, which cir-

cumvent MSDOS.

But VisiOn won't work with them either, and Visicorp will release a whole new line of applications programs. Meanwhile, Quarterdeck Software of LA's recently completed Desq is another inexpensive windowing system that will be open to existing software allowing flexible integration of old programs on an IBM PC: sure to be popular with small businesses.

The next few months will see heavy ad-fall from VisiOn, Quarterdeck and Microsoft, and by next summer at least half a dozen other competitors for the IBM windowing market expect to have their wares on the streets. Far too early to tell the winner in the resulting crunch, though one interesting point to note, perhaps, is that while software developers working on VisiOn are having to use a DEC Vax mini, programming for windows will take only a PC.

More and more new hardware products are in the works. Watch for an IBM-compatible MSDOS TRS-80 launch in the spring. CompuSource of Minneapolis has announced the

Abacus portable, Apple-compatible system that can run CP/M and Apple software. The machine will come in an aluminium case with 9in amber monitor, 64k RAM, with optional disk drives, ports, and will weigh 28lbs. A single drive system will cost \$1,595.

Further good news for Apple users was the announcement by Rana systems of an MSDOS 16-bit software box for the Apple IIe and II+. Quoth Apple chief John Sculley: 'This is a gateway to the MSDOS world.'

The display of PC Jr brought further mixed reviews and allowed Atari and Coleco to safely boost their prices on new systems. Atari's 600XL rose from \$140 to \$180 and the 800XL rose from \$240 to \$280. Coleco put up the wholesale price of the Adam by 25 per cent to \$650, thus ensuring a store price in excess of \$800. Coleco is now not seen as able to reach its goal of 400,000 units by Christmas. And big retail chains (JC Penney, K-Mart) will not stock Adams.

Chris Rowley in the USA

PC 84

Inside: In

The wonderful world of the personal computer opens up again at PC84 The 2nd Australian Personal Computer Show.

And, like the previous Show, it's the one and only place for the newest, biggest, smallest, costliest, cheapest, finest, micro hardware, software, bolt-ons and books.

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Admission \$4.00 — but to you \$3.00. Clip and keep this voucher to save \$1.00 when you buy a PC84 Show ticket on the day.

Remember Wednesday is business day.

You'll need a business card to gain admission.

The 2nd Australian Personal Computer Show

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Sydney, Brisbane, Adelaide, Hobart and Perth. The one in Canberra will be the largest of its kind outside North America, says Datamatic.

Frank Linton-Simpkins

Post 1984

The hardest thing about

talking to beginners is that they always want to know what a 16-bit micro actually is — and, of course, the one thing it isn't, is a 16-bit micro.

So I'm delighted to welcome two 32-bit micros, which really are 32-bit micros.

The Intel 8088, as in the IBM, is often called an '8/16-

bit micro' when it is actually a 21-bit micro. The Motorola 68000 chip, often described as 'a 32-bit micro' is actually a 24-bit system.

The measure that matters, of course, is not how 'big the word is' but 'how wide the address bus is' — and anybody who doubts you only has to look at the TI-99/4 home computer, which is a 'true 16-bit processor' with only 16-bits to its address bus. It therefore has only 32k words of memory (that is 64k bytes).

Now that you're properly confused, the news is that Zilog has released details of the Z80,000 and National Semiconductor has released samples of a nearly secret chip, the 32032.

The rivalry between the two designs will take ages to reach the stage of fighting for shelf space in shops.

At the moment, the Nat Semi chip is 'available' if you have over \$300 and only want one to try out. The Z80,000 is not yet 'available' to that extent.

Both are 32-bit micros in the way they handle data. They can get 32-bits of data from memory in one 'fetch' down a 32-bit data bus, and process it in a single instruction, without having to shift and count carries.

But the really impressive thing is the 32-bit address bus. This gives them four

gigabytes of possible address space — over 4000 million bytes of semiconductor chip memory can be plugged in, and any byte directly addressed — read from or written to — in one operation.

The other thing you will notice about these chips, should you ever see one, is that they are different to look at.

Instead of being the familiar 'beetle-shaped' chips, with two rows of legs, these ones are square. They have 68 connectors, with no legs: they slot into a recess which grips them, not into a socket which holds the legs.

But it will be 1985, and late 1985 at that, before you are bothered with any brochures saying that 'our computer uses the Z80,000 or 32032 processors.'

Guy Kewney

US versus Asia on the Field of Mars

The main battlefield between the US and Asia will be in Europe, at least as far as semi-conductors go.

Speaking to a meeting of financial analysts in Paris on November 8, Motorola's Marketing Director of Europe, Dedy Saban,

'SAVE' 'SAVE' 'SAVE' JUST LOOK AT THESE Apple Compatible Accessories ...

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postulated that since the US totally dominated its own market, and Asia's dominance of its own market for semi-conductors was as great, then the only place left to meet in competition was Europe. Mr Saban said that he expected the indigenous European semi-conductor industries to ultimately go under in the face of Asian and US competition.

In the light of the willingness in the US to fight as many of its wars as possible in Europe, the EEC group's relevant ministers have agreed to launch a major 10-year common investment and development program aimed at closing the technological gap between Japan and the US on one hand, and the EEC on the other.

Despite the plans outlined by the ministers, Mr Saban said that he expected the US

and Asian share of the European market to grow from 52 per cent US and eight per cent Asian this year. Mr Saban feels that the 1983 world market for semi-conductors stands at 17 billion dollars. By 1988 he expects this figure to exceed 88 billion. At present, the US holds 46 per cent of the total world market and Japan 27 per cent. Mr Saban feels that these figures will be 50 and 25 per cent respectively by 1988. In fact Mr Saban has few hopes for Europe with imports of semi-conductors to outstrip exports by 1.75 billion dollars in 1983, after a deficit of 1.55 billion in 1982.

Frank Linton-Simpkins

About turn

The good-natured (or so both sides tell us) rivalry

between Digital Research ('DR') and Microsoft continues.

Not content with bringing out Personal Basic, which could be politely described as 'compatible' with MBasic, DR is now inviting MBasic programmers to convert the fruits of their labours to CBasic with a source-code translator which it calls M2CBasic (say it out loud . . .)

M2CBasic, which runs on 8080, 8085, Z80, 8088 and 8086-based systems under CP/M or PC-DOS, translates MBasic and Personal Basic programs to their CBasic equivalent. DR claims that the package will translate more than 90% of the code and print out locations of suspect or untranslatable code. Code which M2CBasic cannot convert can be handled, on a line-by-line basis, by the interactive error-handling facilities

provided.

The reason everyone will want to rush out and begin transferring all their programs is, says DR, to take advantage of the portability of a language which is in any case — according to DR — 'better suited to serious business applications'. 'Digital Research brings MBasic into the real world' was how the press release put it.

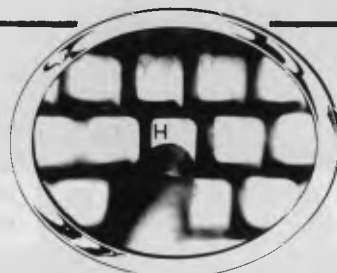
Personally, I think the argument over the relative merits of the two companies' respective languages and operating systems is not a little silly, but at least it makes for entertaining press releases.

Surya

Tandy fixes

I've found a way of overcoming the Model 100's

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line-feed blockage. (It normally won't send line-feeds, not even down the modem port.)

First, the combination of the 'graph' key and the letter 'S' will be interpreted as a line-feed by the text printer.

Second, the text editor's 'paste' button hasn't been correctly programmed, and doesn't strip its line-feeds. So (in the TELCOM program) you can feed a file down a phone line or RS232 link by stuffing it into 'paste' first, and pressing paste in terminal mode.

Finally, I've written a nice little Basic text printer program, and if the Editor forgives me for being late with this copy, I'll offer it to APC to provide to readers, free of charge.

Guy Kewney

A book for the MicroBee

Following fast upon the publication of Wildcards Volume One, Volume Two (120+ pages and paperback) has just been released by B F & N Publishing. This series has been written specifically for Australia's MicroBee PC, although users

of other machines will also find much of it applicable. A collection of tips, techniques and programs, it will enable the reader to get the most out of his or her machine, taking over where the user's manual stops.

Both Volumes One and Two are printed in American Quarto size and feature protective laminated covers. (Volume One has been reprinted.)

Wildcards Volumes One and Two sell for \$15.00 and \$16.00 respectively, and are available from MicroBee dealers and major book-sellers.

Introduction to Pascal

An introductory two-part course, designed to cover all the elements of the Pascal programming language, will be broadcast over the University of New South Wales radio station, starting on 7 March. A repeat of one of Radio University's most popular computing courses, the series is also available on cassette.

Part 1 concentrates on fundamental programming techniques, using illustra-

tions to show Pascal's capability to produce simple, correct and understandable programs.

Part 2 describes data structures such as arrays, lists and trees and recursive programming techniques to illustrate the power of Pascal in handling data storage and retrieval.

Each part consists of six broadcast lectures, and two video programs combined with tutorials held at the

University. Participants can also make use of the University's computing facilities.

Fee for the radio course, including video screenings, tutorials and comprehensive notes is \$32.50, plus \$12.50 for use of computing facilities with some supervision.

Cassettes of the complete broadcast lectures cost \$48 with notes, and cassettes of each video program are



Software is starting to appear from commercial sources outside Tandy and NEC, for the portable machine they both market (built by Japanese firm Kyocera).

The Travelling Appointment Manager is one of eight programs from Travelling Software of Seattle, Wa (tel: (206) 367-8090).

This schedule manager costs \$60, as does most of the range.

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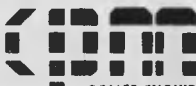
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priced at \$30 or \$50, according to format.

Transistor radios modified to pick up the Radio University frequency in the Sydney metropolitan area are available for \$12, including postage.

Full particulars on this and other continuing education courses by radio and cassette can be obtained from the University on (02) 662 2691.

Burroughs system for schools

Administrative overheads are slowly crushing the efforts of many Australian schools and colleges to respond to demands for increases in both the scope and quantity of services provided to

students.

Burroughs Ltd has announced an Australian-designed system which it believes will significantly cut administration costs, and free more teacher time for student interaction.

The system, Computer-Based Administration System for Schools (CBASS), performs all the major administrative tasks involved in running a school or college: student admissions, class timetabling, maintenance of assessment and examination records, and fee management.

Five major files form the core of CBASS. One of these defines the parameters of the school or college; such things as rooms available, number of departments and methods of fee payments. The other four deal with all the details required about students, class timetables, teachers and subjects.

For example, the subject reference file can hold recommended books lists for each subject in each year.

CBASS is designed to run on the Burroughs B20 computer system, and a user can start with one B20 workstation. As requirements increase, a computing system can be increased through small steps to 17 workstations.

The application programs currently available include: Writeone, an advanced word processing system; Multiplan, an electronic spreadsheet for budget preparation and maintenance; and Data Manager, a fourth generation language for systems design and building.

Burroughs will soon be announcing a new tool for the development of courseware for computer-aided instruction, which will enable the Burroughs B20 to be used as a teaching computer as well as an administrative system.

session, followed by the broadcast lectures at 8pm on Mondays and 7pm on Thursdays of succeeding weeks.

The basic course fee of \$55 covers the broadcast lectures, comprehensive notes, and the 4 attended sessions at the terminals. Additional computer access with some supervision is available for \$15.

Cassettes with notes of the broadcast lectures will cost \$80.

Transistor radios adjusted to pick up the Radio University frequency in the Sydney metropolitan area are on sale for \$12, including postage.

Microprocessor fundamentals and applications

A two-part course on Microprocessor fundamentals, with a sequel on Microprocessor Applications, will be offered by radio and cassette as part of the University of New South Wales continuing education program for 1984.

According to the lecturer, Dr David Mee, of the University's School of Electrical Engineering and Computer Science, it requires no more than a basic understanding of electronic circuits and simple logic networks, and only general computing experience, to do the course.

Part 1 of Microprocessor Fundamentals reaches a level where simple programming and application of microprocessors can be understood. Part 2 discusses further hardware and software functions, typical evaluation modules, and demonstrates how to design, develop and debug a simple

Introduction to APL

An introductory course on APL has been prepared by Mr J B Douglas, recently-retired Associate Professor of Mathematical Statistics at the University of New South Wales. The series of ten lectures will firstly be broadcast over the University of New South Wales radio station, Radio University 2UV, and will later be available on cassette through the Continuing Education Cassette Service.

The course will be of interest to anyone manipulating data, such as statisticians, engineers, scientific workers, business forecasters, and others in the commercial field. No programming experience is needed.

The course starts on 5 March with an attended

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project on a microprocessor.

The course on Micro-processor Applications covers applications in a variety of common situations, each exemplifying different aspects of micro-processor system design.

Each part of the micro-processor fundamentals course consists of 10 broadcast lectures, a video program and two attended tutorials at a cost of \$42.50. There are 8 radio lectures, backed by a video program and two tutorials on micro-processor applications for \$35.

The broadcasts start on 10 April, each lecture being broadcast at 8pm on Tuesdays and 7pm on Fridays over the University's educational radio station, Radio University 2UV.

Audio cassettes of the lectures are already available, at \$80 for each part of Microprocessor Fundamentals, and \$64 for Microprocessor Applications. The video programs cost \$30 or \$50 each, depending on the format chosen.

Transistor radios adjusted to pick up Radio University courses in the Sydney metropolitan area are available for \$12, including postage.

RMIT microcomputer clearinghouse

An Australian Micro-computer Industry Clearinghouse, (AMIC), is to begin operating in Melbourne next year.

The idea of developing such a facility — the first of its kind in Australia — came from the Royal Melbourne Institute of Technology which will operate AMIC through its subsidiary company, Technisearch Limited.

According to RMIT's

Assistant Director (Educational Services), Mr D Pugh, the growth in the number of requests being received by RMIT for information about micro-computers, coupled with the increasing popularity of the Institute's computer familiarisation courses, suggested the need for a centre where the public could test and evaluate a comprehensive range of microcomputer hardware and software.

Mr Pugh explains that the aim is to create an environment where the public can have access to a number of products and software packages, and where there are experts available to assist as demonstrators and to give advice regarding micro-computer applications.

The range of items on display in the Clearinghouse is another reason why Mr Pugh is optimistic about AMIC's prospects. He says that as a result of discussions with industry representatives, he is confident that, when it starts operating early in 1984, the Clearinghouse will have products from around 20 companies on display.

AMIC is expected to be patronised by a large and broad cross-section of the community and will cater for the businessman, professional groups, the educational market, government departments, as well as the growing home market. The Clearinghouse will operate on a fee for service basis, Monday through Friday, with advance bookings being necessary. On Sundays, it will be open to the public for a small admission fee to cover operating costs.

The Clearinghouse is to be located in leased premises adjacent to RMIT at the north end of Melbourne's central business area.

Meanwhile, a January 20 deadline has been set for companies to apply for

foundation membership of AMIC. The membership fee for hardware companies is \$5000 and for software companies the joining fee is \$500. The closing date for foundation membership is to allow for the early election of industry representatives to the management committee. Companies applying for membership after January 20 will not be eligible for a

place on the management committee, or to vote for the selection of the committees.

Information may be obtained from Don Schauder, RMIT, on (03) 341 2062.

Branching out

Adam Osborne is apparently so impressed with the



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success of Lotus 1-2-3, that he is going into software distribution.

'Nobody in software distribution is making money,' he told me, 'and I'm going to introduce a radical new way of handling it.'

He wouldn't say what his secret would be, but I gather from moles that he reckons the age of the hype is upon us, and he reckons he's good at that.

The sad thing about this is, of course, that it signals the end of his own hopes for Osborne Computer.

Plans to buy out the overseas sales for a consortium from Germany, Canada, UK and Australia had failed when we went to press.

According to Osborne himself, 'the CP/M market in the US is dead for anything over \$2000, and even the cheap systems will be unsellable in six months.'

and he doesn't give the market long to switch to MS-DOS and CP/M-86 as standards.

Guy Kewney

NEC announces dual operating systems

NEC Information Systems has announced that dual operating systems will be a standard supply with its 16 bit Advanced Personal Computer.

From 1st December, all machines shipped from NEC's Sydney warehouse are being supplied with both the Microsoft MS-DOS and the Digital Research CP/M-86 operating systems. These operating systems are included free with the

purchase of an NEC Advanced Personal Computer, representing a cost saving of \$350.00.

End-users can now enjoy a greater selection of available software packages, including Wordstar, Benchmark, Spellbinder, Multiplan, Microplan, dBaseII, Attache, Padmede, IMS Accounting and others, without purchasing an additional operating system, or sacrificing a preferred package for one that will run on an existing operating system. Software developers have the advantage of writing programs in their favoured operating system language.

For further information contact NEC on (02) 438 3544.

Unix users

The Australian Unix Users

Group will be holding its biannual meeting on February 20-21, 1984 at Sydney University. The meeting is open to anyone currently using or interested in Unix.

Manufacturers of Unix based systems will be exhibiting equipment, providing an opportunity for evaluation by current and prospective users.

The first day will be devoted to general interest non-technical papers on Unix. Presentations will be more technically oriented on the second day and will cover Unix applications and system development.

For those with little or no Unix experience, tutorials will be run in conjunction with the meeting if there is enough interest. The Registration fee for the meeting is \$20-\$30, and covers both days.

Australian Unix Users

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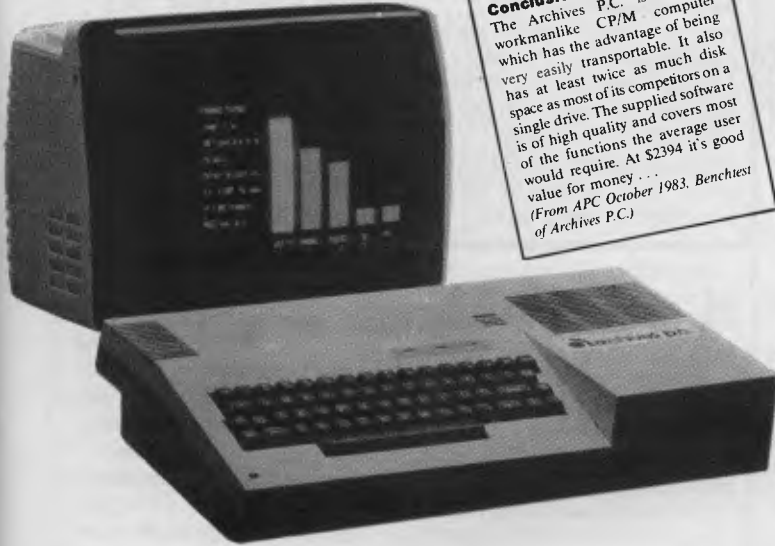
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 (From APC October 1983, *Benchtest of Archives P.C.*)



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The program committee further invites interested speakers to submit abstracts of papers for presentation at the conference by January 2.

Further information can be obtained from Piers Lauder, Basser Department of Computer Science, Sydney University, Sydney 2006. Tel: (02) 692 2824, or S.U.N. address — piers:bdsservax (Electronic mail is preferred.)

Launch of AppleFile III

A new data management program called AppleFile III provides a system for organisation, management and maintenance of large files on the Apple III personal computer.

AppleFile III, developed by Apple Computer, enables users to store, arrange, review and print records in files up to 16 megabytes in size. Unlike Apple's Quick File III data management system, which is designed for use in the home or office to manage small to medium-size files, AppleFile III utilises mass storage to manage large-size data files that businesses and professionals require.

AppleFile III is a structured high-capacity data management program that permits users to scan thousands of records by listing a summary position of each record. It also allows users to redesign a set of files without retyping data contained in the files.

AppleFile III is based on record processing services (RPS), a programming tool that allows data files to be interchanged among other

programs built on RPS.

In addition, AppleFile III provides 80 fields per record, 8 keys per file, 8 fields per key, and storage of 20,000 to 30,000 records of 100 characters each on empty profile hard disk.

Designed for professional data management, the program enables users to print reports in rows and columns, and to summarise data with totals, averages and counts. Users can organise information into any of eight orders or create a temporary order with which to print reports.

AppleFile III requires an Apple III personal computer with 256 kilobytes of internal memory and a profile hard disk or comparable unit. Available now from authorised Apple dealers worldwide, its recommended retail price is \$395.00.

For further information contact Burson-Marsteller on

(02) 241 3016.

Qume PC printer introduced by Sigma

Announcing the release in Australia of the new \$896 Qume LetterPro 20 daisy-wheel printer, Mr Faktor, Sigma's Managing Director, explained that the printer has been "specifically designed by Qume to provide small businesses with affordable professional-quality word processing."

Plug compatible with most popular desktop computers, the LetterPro 20 enables personal computer owners to easily and fairly inexpensively upgrade from

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dot-matrix to letter-quality printing.

The LetterPro prints at a speed of 20 characters per second and Interface options comprise Centronics parallel, RS232 Serial, and Qume Sprint 3. Available accessories include a letter guide and a bidirectional forms tractor feed.

The same 96 character printwheels as used in Qume's range of Sprint series printers are also used with the LetterPro 20.

Many of the design features found in the Qume Sprint II PLUS family are also included in the LetterPro 20: the carriage design is the same; both use the easy-loading Qume Multistrike II and III ribbons; both support command bidirectional printing in 10, 12, 15 pitch and WPS.

For further information contact Sigma Data Corporation.

School raises \$12,000 with computer exhibition

A Sydney primary school wanted to choose the right computer for its pupils — and ended up making \$12,000.

East Lindfield Public School formed a sub-committee of its Parents & Citizens Association to decide what computer would be best to buy for the school. The committee members found they were presented with a bewildering array of choices.

They decided to call all the suppliers together and have an exhibition. The exhibition, held on November 19, attracted 4000 people.

More than 25 brands of

computers were displayed at 28 stands throughout the school grounds. Philip Woodman, Sales Manager for Amicron, said the response was extraordinary.

"Our stand was 36 feet long and people were packed three deep along it for most of the day," he says.

"We went along to the exhibition mainly out of a sense of community service. However, it turned out that we made a healthy number of sales as well. It was a most successful promotion."

Shake-down in the Tokyo corral

from Serge Powell in Japan

What's the opposite of shake-out?

Whatever it is, there seems to be a minor happening here at the moment. Perhaps it's a shake-in; in part it must have something to do with MSX Basic, but it also bears out the old adage that the personal computer business is still full of opportunity for any computer or person with an idea. The idea can be new or good, but the best ones are both.

I must admit that I was sceptical when the press hand-out crossed my desk, especially when I came to the line 'A bold step . . . to establish a solid base in the personal computer market based on extensive expertise in consumer audio and video products' — this at a time when some companies with extensive expertise in the PC market are having a hard time making a go of it.

The first reaction is to sit back and sigh: 'Ah yes, another Japanese manufacturer entering the fray.' But this one could have more to recommend it than most. Perhaps JVC is on to a

good thing. Learning from its gross marketing mistake when it sponsored the inept England touring team to Australia last year, it has stuck to what it's good at.

The product hinges on a little unit called a Superimposing Adaptor that connects to a not particularly spectacular computer — 16k or 32k of RAM, 32k of ROM, 32 by 24 display, 256 by 192 graphics, 16 colours, and MSX Basic-compatible.

With JVC's well established name for video cassette recorders and VHD laser disks it isn't so much a question of the company entering the personal computer market as adding a natural extension to its existing product line.

Consider, for example, the use a Japanese family might make of the new device (I forgot to mention that for now, the product is destined only for the domestic market

so those on holiday abroad will have to wait a while). After video-recording the family's antics on their portable VCR with scenic highlights in the background, Poppa and Momma Tanaka and all the little Tanakas hurry home, connect the family computer to the video system, and lo and behold, they start superimposing titles and integrating graphics with their video tapes just like the professionals.

The possibilities opened up by interfacing with a video disk are even more intriguing when you take into account the vast amount of visual information a laser disk can store; and the direct access capabilities of the laser playback system coupled with the programming possibilities of the ROM packs that slot into the JVC computer; not to mention that the Super-

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imposing Adaptor can be coupled to joysticks.

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There will be more — you'll be able not only to read about them on screen but see them as (at the very least) still pictures, and possibly motion pictures that will change perspective dramatically as you interact with the game.

On the serious side, the potential for educational programmers is even more impressive, especially in technical fields, all of which helps to answer the never ending question of what the future might possibly be holding in store for chip-heads.

But it still leaves me wondering what the opposite of a shake-out might be.

While the western world worries about a chip shortage Japan is going through a less serious dearth: this is led not by the computer makers but by audio, VCR and television manufacturers. VCR equipment in particular is seen — as far as sales are concerned — as a heavy drain, but JVC won't be cutting its own supply lines just yet.

Oddly enough the demand for VCRs is linked by some industry observers to the forthcoming Olympic Games. If it persists, you probably won't be seeing the Superimposing Adaptor overseas for several months, but Japanese visitors to the Games face an unprecedented possibility: filming everything with their video cameras, they can return home and alter things with the micro so that Japanese competitors win everything.

Multi-user Digital PC

An Australian software

group headed by Samaka Pty Ltd has announced a multi-user operating system and integrated application package called ISYS/PC for the Professional 350 Personal Computer. Up to twenty active processors can be run simultaneously and up to three video terminals (each with a printer) can be connected to the system. However, with a recently released real-time interface the number of terminals (each with a printer) can be increased to five.

The ISYS/PC software is a general purpose multi-user database management system and is upgradeable throughout the Digital product range including the Micro/PDP-II, LSI-II/73 and VAX-II systems. ISYS/PC is derived from an original ISYS system which has a wide installed base of users on the PDP-II mini-computers.

It's not over yet

Obviously the news story of the month is the question of software copyright. The anticipated barrage of items related to this fast-becoming-an-emotional issue has begun and to accelerate its publication we've decided to reprint four articles we've received in *Printout* rather than wait for next month's *Communications* column (this month's has already gone to press).

The event that accelerated this public attention to the question of software copyright infringement was, of course, the action taken against Computer Edge Pty Ltd by Apple Computer Australia Pty Ltd in the Federal Court. The action was dismissed on the grounds that "Australian copyright laws do not protect certain computer software", to quote a joint statement from Senators Gareth Evans

and John Button and Barry Jones MP. Apple has appealed against the decision.

Below we have reprinted, in full, the joint statement mentioned above; a letter from Albert Langer, Spokesperson of "Software Liberation"; a statement from Michael Suss, MD of Computer Edge Pty Ltd; and a statement from the Australian Computer Equipment Suppliers Association. Apple Computer Australia has declined to comment at this stage as the Federal Court decision is subject to appeal.

As an aside, it is perhaps ironic to note that, in the midst of the battle being waged in Australia by Apple Computer Australia, Apple Computer Inc. (i.e. the parent company in the USA) has agreed with Franklin Computer Corporation to terminate the litigation commenced by Apple against Franklin. "The settlement agreement between Apple and Franklin sets up an arbitration procedure for any future copyright infringement disputes between the companies relating to any substitute Apple-compatible computer program," according to a recent statement from Apple Computer Australia.

*Sir,
Somebody must have lobbied pretty hard to get an announcement, only three days before Xmas, from three Ministers, threatening speedy and even retrospective legislation on copyright.*

If it's really to protect an "Australian software industry" then the legislation will not be automatically extended to cover foreign software. This would require a separate proclamation under the Copyright Act anyway, and there is ample precedent for not extending it. The United States for example, refused to recognise foreign copyright on books for many years, in the interests of its own

book manufacturers (as distinct from authors).

If legislation covering foreign software is introduced hastily, it will not be to protect an Australian industry, but out of fear of what would happen if people get used to freely available software, even for a few months. That's why "Software Liberation" is encouraging the rapid dissemination of as much uncopyright imported software as possible, before any legislation can be introduced.

Obviously programming has to be paid for, but royalties aren't the only way to pay for it, any more than commercial ads are the only way to pay for TV programming. Ultimately, software could be treated like scientific research — with publicly funded grants and contracts, and the results placed in the public domain. Australia could lead the way in this, by refusing to recognise foreign copyright (especially U.S. software copyright which requires registration in the U.S.A.) and instead undertaking to fund an amount of public domain software equal in value to what Australians would otherwise have paid overseas for royalties.

That is more or less what we do instead of just living off other countries basic scientific research, and it makes a lot more sense than, trying to recover the costs of research by high prices on scientific journals and lots of police guarding photocopy machines. We would actually have an Australian software industry then, instead of representatives of foreign monopolies trying to con our Government that "What's good for Apple is good for Australia".

Meanwhile, Australia could enjoy the benefits of free software for most computer users here, at the cost of a very small compensation payment to the practically non-existent Australian packaged software industry. (Contract programming is unaffected by the present copyright situation).

Computer users should

PRINTOUT

URGENTLY demand a public inquiry before any special legislation.

Yours sincerely,

*Albert Langer,
Spokesperson, "Software Liberation", C/- Unemployed Workers Union, 301 St Georges Road, North Fitzroy 3068.
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21 December 1983

ACTION ON COPYRIGHT LAW PROTECTION OF COMPUTER SOFTWARE

The recent decision of the Federal Court that Australian copyright laws do not protect certain computer software has created significant problems for the software industry. This is an important industry in its own right and is capable of making a real contribution to the Government's industrial development objectives.

The lodging of an appeal against the decision means that the legal status of software is uncertain. However, industry should note that it is the Government's intention to promptly undertake such legislative action as is necessary to ensure that software is adequately protected. This action could include if necessary some backdating of legislation, certainly to the date of this announcement, and possibly beyond.

The decision also has broad implications for intellectual and industrial property in Australia. Departments have already consulted with industry regarding international developments on the legal status of computer software, computerised data banks and computer-created works. These matters have also been raised

in the current review by the Attorney-General's Department of audio-visual copyright laws.

Regarding legislative protection of software, a major issue to be resolved in the long-term is whether a copyright style of protection is to be preferred, or a form of protection more analogous to patents. International consensus on this issue still seems some way off.

Ministers stressed however, that prompt legislative action would be taken in the short term if necessary. A first step may be to amend the Copyright Act 1968 to confer copyright protection on computer software. Interested parties would be consulted on the appropriate form of such action. It will be necessary to ensure that proposed solutions are consistent with existing copyright, patent and designs laws and with Australia's obligations under the relevant international conventions.

A symposium will be held early next year to bring together industry and user groups, intellectual property lawyers, academics and government experts to discuss an appropriate policy for the longer term.

All enquiries may be directed to Mr P Crisp, Attorney-General's Department, Canberra, ACT, 2600 (Telephone: (062) 71 9608).



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GOTO Page 111

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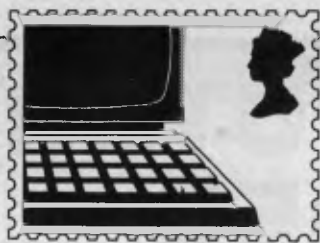
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APC welcomes correspondence from its readers but we must warn that it tends to be one way! Address letters to: 'Communications', APC, P.O. Box 298, Clayton, Vic 3168.

A bit bigger

It seems that in fifteen years we have progressed from the four bit, through the eight bit, to the sixteen bit micro. The thirty two bit is just around the corner. This implies that by the year 2000 we will be blessed with a 256 bit machine. Since this will be capable of addressing directly about 10^{77} words of memory, close to the number of atoms in the observable universe, I would suggest that disk drive manufacturers start work on something very big right away.

N Osborne

Getting there

I have just read the article 'Portable Problem' in *Braindump* (APC, October). Firstly, I would like to congratulate you on an excellent magazine and a good article.

Secondly, I would like to inform you of a new computer on the American market which is not unlike the one you described: the Grid Compass.

It is portable, of the 'Briefcase' type, with an 8086 and 8087 co-processor. It has 256k of bubble memory and a hi-res screen (flat-panel). It has a 300/1200 baud modem and a battery-backed clock.

Now for the drawbacks: the screen is only 53 x 24 (hi-res of 320 x 240). It has no built-in drive, as the bubble memory is meant to suffice. It is not battery powered and it costs \$8100, and the software is an extra \$900.

I admit this is a long way from 'Portable Utopia' but it is a good step on the way.

Paul Fremantle

Please please

Could you please print in your magazine the meanings of the different Benchmark timings, as only too often do I see under the Benchmark timetables 'For an explanation of Benchmark programs see APC, November 1982' which I hasten to add I haven't got and never did have.

It sometimes drives me to tears (almost!) when I see a new machine that is given non-ending praise and at the end is just a list of numbers.

So please help those of us who have been getting your wonderful magazine (creep, creep) for so long.

Kiaran Smyth

(See this issue — Ed.)

Micro reservations

I feel there is a lot of misunderstanding surrounding the use and potential use of computers in schools. I am writing to express the way that I see the issue, thus hopefully provoking thought and comment. I have just left school, and so my views are born out of a certain amount of experience.

As I see it, there are three main areas in which computers are thought of as useful in school education. These are: firstly, for teaching (i.e. replacing the teacher); secondly, as a tool for providing teaching aids (both replacing existing methods and providing new aids); and thirdly, for giving experience of computers. I shall comment on these areas in order.

The first area may be dismissed completely.

Teaching does not consist of providing a monologue of facts, formulae and proofs; it requires discussion and an ability to see a pupil's viewpoint, thereby producing a comprehensible explanation. Until computers can pass the Turing test they are useless for this function. The current range of programs that 'teach' physics, etc, are of less use than a good textbook — and only the most exceptional pupils at school can learn significant amounts from textbooks. Textbooks are used for reference and exercises, not teaching.

The second area has much potential, yet this potential is virtually untapped. The current programs that use the computer to provide practice for pupils — e.g. arithmetic practice, geography practice via hi-res maps, etc, — are, in my opinion, a waste of time. The practice they provide is either superficial or already adequately provided for by normal methods. The fact that children use computers more readily to do such practice is solely because computers currently hold a strange fascination for children. This will rapidly vanish, as computers become more and more common. Children will very soon be unwilling to do boring tasks merely to 'use a computer'.

The really useful area is in providing a new range of aids for teaching. For example, in mathematics and physics the graphics of a computer could be used to demonstrate things visually; but to be accepted they will have to be better (and they can be, considerably) and easier to use than blackboard and chalk. In history, computers would be useful as expert systems — but again they will have to be more comprehensive and

quicker to access than reference books. The reason why computers are not used for these genuinely useful functions today is that it takes tremendous amounts of extremely good software to provide such facilities — plus sophisticated hardware. We ought to start tackling this (admittedly enormous) challenge now, and stop wasting time on sine wave and simple arithmetic programs.

The third area is harder to discuss. It is generally agreed that people, particularly schoolchildren, should be made aware of computers, so as to be able to face up to the computer revolution. But what is the effect of computers going to be? How will our society be revolutionised? I don't know, and I don't think anyone does. But we have to make people aware of the possibilities, and, in particular the dangers.

Certainly hands-on use is valuable in familiarising people with computers, but it is not enough; the possible consequences of the computer's power must also be taught. You don't gain that sort of knowledge playing Monsters.

That's most of my hang-ups on this subject aired. Perhaps you, or other readers, would care to comment on them?

David Harrison

(I am very interested in feedback on all aspects of micros in education — Ed.)

Beginner's tips

On reading the October issue of APC, I noticed that Surya made a very common error in his 'Beginner's guide to program conversion'. He states that 'repeat-until and

COMMUNICATIONS

while-endwhile) . . . are two forms of the same loop, one being the logical reverse of the other.'

There is one essential difference between while <cond> and repeat <block> <block> endwhile until not (<cond>)

The 'while' form checks the condition first. If it's false, then <block> is not executed even once. By contrast, the 'repeat' form causes at least one execution of <block>, even if the condition is initially false.

Wherever a 'repeat-until' is used, it may, if desired, be replaced by a 'while-endwhile' with inverted condition (although there are several cases where a 'repeat-until' is more natural — which is precisely why any decent structured language provides both constructs).

As practical examples of differences, consider the following two examples: first, a routine to throw a die until a six is thrown:

```
repeat
  DIE:=rnd(1 to 6)
  print 'You throw a', DIE
until DIE=6
This can be written as a
somewhat convoluted 'while':
DIE:=0 (indeed, any number
that isn't six)
while DIE < >6
```

```
  DIE:=rnd (1 to 6)
  print 'You throw a' DIE
endwhile
(although no-one but an
idiot would use this if they
had repeat-until available).
```

Second, consider a routine to print a sequential file:

```
open FILE$
while not (eof)
  readline (A$)
  print A$
endwhile
close FILE$
```

(eof is a boolean (true or false) function indicating whether or not the End Of File marker has been encountered. Any attempt to read a line of text when eof is true will probably crash the routine). Using the Surya-style conversion, we

```
obtain:
open FILE$
repeat
  readline (A$)
  print A$
until eof
close FILE$
```

Whereas the first form correctly detects, when the file is empty, that eof is true initially — and so immediately closes the file, the second form attempts to read a line of text from the empty file — thus crashing the program.

Therefore, to summarise, any repeat-until may be replaced by a while-endwhile — but with some loss of clarity, but the converse is not true — attempting to convert from a while-endwhile to a repeat-until does not usually work.

Duncan White

Yes, you are quite correct. When converting from a while-endwhile to a repeat-until loop it is sometimes necessary to insert manually a test which somewhat defeats the point of the loop! It is, however, usually possible to make the initial test before entering the loop, thus retaining some degree of structure. Thus:

```
OPEN FILE$:IF NOT OF
THEN PROC readfile ELSE
CLOSE FILE$ . . .
DEFPROC readfile
```

```
  REPEAT
  READLINE (A$)
  PRINT A$
  UNTIL EOF
  CLOSE FILE$
```

I would, however, agree wholeheartedly that a truly structured language should offer both constructs.

Surya

Jargon aid

I am writing to you in a desperate attempt to find out what PEEK, POKE and DIM mean. All the magazines I have read tell you in gibberish. Please, I

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beg you, tell me in plain English.

S Gibson

An explanation of PEEK and POKE will be found in our 'Newcomers Start Here' feature. I suspect that the reason you found previous explanations amounted to no more than gibberish is that the explanations were presented out of context. If you read through 'Newcomers', PEEKs and POKEs should then make sense.

DIM is another statement which needs to be examined in context. DIM is an abbreviation for DIMENSION and is used to specify the size of an array, as explained below.

If you wanted, for example, to enter five different names into a program, you could do so thus:

```
100INPUT"Enter name 1";A$
110INPUT"Enter name 2";B$
120INPUT"Enter name 3";C$
130INPUT"Enter name 4";D$
140INPUT"Enter name 5";E$
```

When you wanted to print the five names, you would then

```
150PRINT A$:PRINT
B$:PRINT C$:PRINT
D$:PRINT E$
```

Although this would work, it is extremely tedious, particularly if you had fifty or a hundred names to enter. It would also be very inefficient if you wanted to extract (say) the fourth name on the list. To get around the problem, Basic supports a facility known as arrays.

Arrays allow you to store both strings and figures in numbered variables, known as array variables. Thus, instead of using the variables A\$-E\$, we could use

```
NAMES(1)-NAMES(5) like so:
100FOR COUNT=1 TO 5
110PRINT"Enter
name";COUNT:INPUT
NAMES(COUNT)
120NEXT COUNT
```

To print the list:

```
130FOR COUNT=1 TO 5
140PRINT
NAMES(COUNT)
150NEXT
```

And to print a specific name:

```
160INPUT"Which name shall
I print (1-5)";NUMBER
170PRINT
```

NAMES(NUMBER)

Each string in the array is known as an element. Most machines will quite happily allow you to enter arrays of up to nine elements without complaint, since they reserve sufficient memory for this purpose automatically. If you want to store more than nine elements, you need to tell the computer to set aside enough memory to do this. This is where our friend the DIM statement comes into the picture. The format is DIM VARIABLE-NAME (number of elements + 1). Thus, if we wanted to store 50 names in an array called NAMES\$, we would put the following line in our program: DIM A\$(51).

DIM statements need to be executed before you start using the array, so we normally place them in the first non-REM line of our program.

Surya

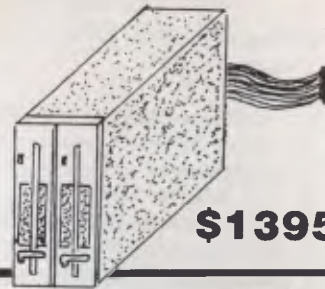
Atari challenge

After reading your November 1983 issue of *Australian Personal Computing*, I am compelled to write to you concerning numerous comments relating with the Atari Personal Computer.

Being the librarian of M.A.C.E. (Melbourne Atari Computer Enthusiasts) and MACE's official programmer I would like to "set a few things straight".

Firstly concerning the new language ACTION! OSS markets this product not Atari as stated on page 7. Yes it is a superb language, super-fast, brilliant editing capabilities, and overall a nice structured language. Being the first person in Australia to use this language, I immediately fell in love with it. To me Action! warrants buying an Atari computer. Versions of

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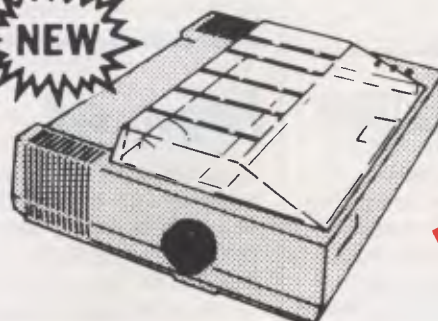
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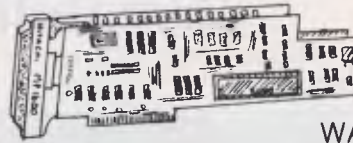
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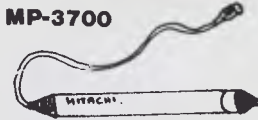
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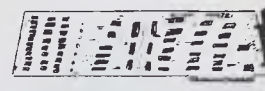
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Action! will be coming shortly for the Commodore 64 and Apple computers from OSS. In fact when I spoke to OSS last Friday, I asked them have Atari bought the rights of this new language? The answer: "That's a whole cock and bull what ya read in your Aussie magazine!"

While on the subject of Action! May I take this opportunity to inform you of AAUG (Australian Action Users Group). AAUG is not related to any specific machine but to the language Action! itself, we hope to promote the language itself and swap experiences with this new breed of hyper-cartridge (Well that's what OSS — Optimised Systems Software call it! Do you know that the Action! language itself is 24k, but only takes up 8k of RAM at a time, due to bank switching of the chips! If you would be kind enough to list this new users group in your users groups directory.

Moving right along, next on my hit list is your review on the Atari 600XL. I have not really got a hit list, its just that, lately I am getting annoyed with published data in computer mags which is just a mistruth, and have finally decided that it was time for someone to speak out, if no-one has in the past.

The 400 has never been sold here in Australia without the Basic cartridge. This was true in the States, but here in Aus. Futuretronics have always sold their computers with Basic. Although not shown on the keyboard, all those sneaky combinations of the keyboard are listed in the users guide (Cntrl 1, Cntrl 2, Cntrl 3 etc), and it takes no time at all to remember them if necessary!

Wrong yet again — Yes it is possible to have all 256 colors on the screen at once, would you like a program to

do this? Just ask, and I'll send you a listing of several small programs that accomplish this so called impossibility.

The character set on the Atari is redefinable, it involves moving the old character set from ROM into RAM, modifying it here in RAM and changing the pointer to point at the new character set. How do you think Atari and others create such good arcade games — most are all using re-defined character sets!

Those new graphic modes are not unique on the XL series of Atari computers, they are on the "older" models although hidden to the average users. Remember everything that the 600 can do the 400 and 800 can also do — Its just a different case.

"Player missiles are Atari's answer to Sprites" — What a load of codwallop! Who was the first to use these???? Atari came before all others, maybe this was a misprint? Should it had said "Sprites are the answer to Atari's Player Missiles". Sure other computers have more Sprites than Atari's 4 or 7. But you must remember that the Atari computer is older and more mature than the latest Commodore and Spectro-video computers. The new breed of computers have benefited from Atari computers — learning all about "sprites".

Other statements made in your review of the Atari 600XL give the impression that the 600XL is more powerful. You gave the impression of an inferiority complex to the older models of the Atari computer range. All Atari personal computers are identical!

The basic convertor chart, an excellent idea, although a couple of boo-boo's. Some most likely typographical errors which I will mention in case no-one else picks them up.

INKEY\$ can very easily be

simulated with PEEK(764) which will return the internal code of the key pressed or 255 for none. Loading and saving can be in the form of LIST and ENTER. The Atari has a very nice operating system which allows you to LIST to any device among other things. When LISTing a program to disk, cassette, editor, screen, printer, or thru the RS232 ports, it is sent (or saved depending on the device) as an Untokenised file. The equivalent of OUT in Atari Basic is PUT #fileno or PRINT #fileno (Atari's O.S. again allowing versatility). The equivalent of CALL in Atari Basic is USR (memory address,parameter,parameter, . . .). The width of the screen is controlled by location 82 for left margin and 83 for the right hand margin. (Be a bit hard for location 83 to control both wouldn't it????)

Keith Chambers

We did not say that Atari had bought the rights to the Action language. "Atari is set to launch . . . Action for its home computer range" simply refers to the fact that Action will become available in cartridge form from Atari dealers.

With reference to the statement "The 400 has never been sold here in Australia without the Basic cartridge", we (the APC staff) bought a 400 some time ago and the Basic cartridge was not included in the price, although it was available as an optional extra.

The number of colors that the Atari can display simultaneously is a moot point. According to "The Creative Atari" by Small, Small, and Blank, "because Basic is so slow in execution . . . only five colors can be shown at one time . . . [excluding] players and missiles, which can have independent colors" (p32). However, by using display list interrupts (i.e. machine code) "A total of 128 shades of color on the same screen is the limit

of the Atari" (p37). If you know how to get all 256 on the screen at once, great! Send us your program!

You are right about being able to redefine the character set, but that isn't quite the same thing as having a command which lets you redefine a particular character.

As for "sprites" versus "player missile graphics", that's tricky. Sure, Atari were the first to put this kind of thing into a home computer, but to the best of our knowledge the term "sprite" was already in use in computer research circles to describe a "thing" within a system which could be set in action and then left to its own devices without any further explicit programming, e.g. a graphic shape moving across the screen. If you re-read the 600XL checkout, you will see the following: "The new machines come into their own with an Expander box. This uses the parallel bus and so . . . can't be bought for the 400 and 800." "Performance wise you don't get much over the existing 400s and 800s . . . What you do get is a computer with a superb keyboard and serious expandability." There is no suggestion that the 600 is more powerful, just that it is an improvement over the older models.

Thanks for the notes about the converter chart. The reason that PEEK(764) wasn't mentioned is that the converter was intended as a straight Basic-to-Basic reference. Are you sure that LIST and ENTER are really equivalent to LOAD and SAVE? Don't they have a different effect on the variable table? As the Atari uses the 6502, an OUT command simply isn't appropriate (the 6502 does not have I/O ports, memory-mapped I/O is used instead).

Could you expand your comment about USR? Is the syntax USR(address [,parameter . . .]) or is there also a form USR(parameter) as shown in the chart? — Ed.

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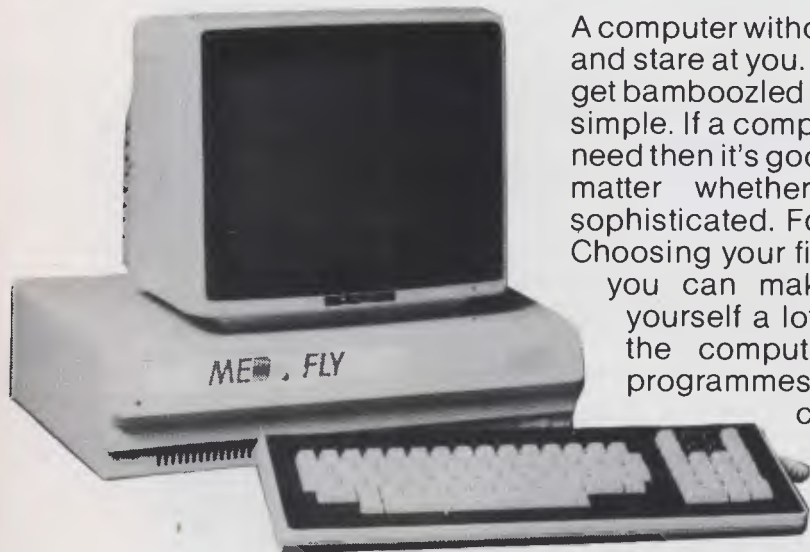
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OCAS is a system for keeping records of office costs and providing various reports regarding these costs. Costs can be either time related or fixed cost. Normal monthly reports cover client reports detailing client jobs, and the associated time and costs; staff reports covering the jobs performed for individual clients; and task reports listing the staff involved.

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Instead of being limited to primitive, labour intensive and slow management systems which are prone to error, you now can move into modern cost effective methods to handle on line telephone and over counter enquiries, as well as accounting and mailing, and has the flexibility to adapt to your needs while requiring less skill than a manual system.

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Membership records can be accessed by the alphanumeric code or by surname. With the 816's enormous disk capacity, one disk can hold, if needed, records for approx. 2,500 members!

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Need to track jobs as they move through your organisation? No need to create a special programme as the ARM Data Base has been specially configured to cover the project costing. As in the Database itself, everything is menu driven and there are no complex commands to learn; sample files are also provided for a "hands-on" demonstration.

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The newest in Word Processing from the creators of the famous Super Calc programme, also incorporates a full on-screen help function, and an integrated dictionary of over 20,000 words, which customises itself to your vocabulary.

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From Australia comes the ARM Data-Base, with forms management. It is not just a file management system. There are no complex commands, and the quality and sophistication of the data-base make the system easy to use; everything is menu driven and a demonstration data-base is supplied.

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One of the best known and supported spread-sheet programmes is also supplied free with the 816. The work space available is a massive 29K, compared with some others at 11K.

You have 64 columns and 256 rows to use. Vary the width of individual columns at will; headings automatically extend across vacant cells; a help function is always available on screen; and of course, all the usual spread sheet functions.

Cash flow, budgets, and 'what if?' situations are a breeze using Super Calc. The only limitation is your own imagination, and we have several books on Super Calc to help you with ideas.

And finally the 816 comes complete with two utilities:

COMMUNICATIONS SOFTWARE XMIT/RCV, to permit files or programmes to be transmitted from one machine to another at up to 9600 baud through the RS232 port. (Of course, the "other" computer needs it's correct XMIT/RCV programme to make it work.)

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Z80A, 4MHZ, 64K RAM, 2 x 5 1/4" D/S D/D disk drives of 1.6 megabyte approx. Provision for 2 more 8" or 5 1/4" drives, Centronics printer port, 2 RS232 serial ports, CPM 2.2, 5" 80 x 25 CRT Green Phosphor, RCA external monitor connection, 110/240 volt, 5 function keys, cursor keys, Mouse Capability.

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The built-in controller can read and write single and double sided, and single and double density, formats of 3½ inch, 5¼ inch, and 8 inch floppy drives. The MAX-80 can control eight drives (of mixed sizes, sides and densities) at once.

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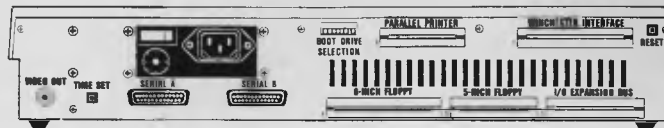
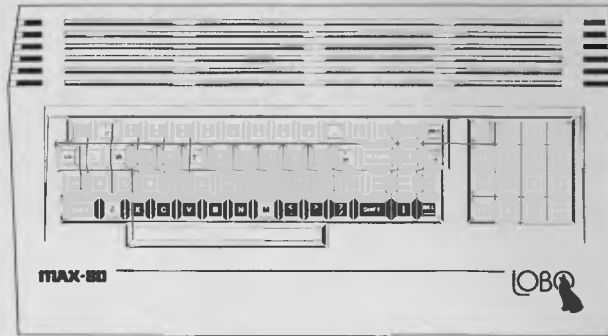
The 76-key professional keyboard (including a numeric keypad, 4 programmable function keys and 4 cursor control keys) is completely software configurable (and reconfigurable).

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Together these systems can run a complete office, from the secretary's letters and bookkeeper's calculations to the sales rep's mailing list and the manager's business projections. Yet the entire MAX-80 office system (MAX, monitor, disk drives and complete software) costs less than just the hardware of the average small business computer.

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BENCHTEST

NEC-8201A

The Japanese company, Kyocera, was responsible for manufacturing the portable TRS-80 Model 100 to Tandy's specifications. David Tebbutt takes a look at the modifications NEC has made to the machine.

About two and a half years ago 'Kay' Nishi, a director of Microsoft and founder of the Japanese ASCII group, was flying to Tokyo. On the flight he met the president of Kyocera, a company which at that time was a leading packager of semiconductors. Nishi described his dream of a lap-sized personal computer with a full-sized keyboard, a screen large enough to display several sentences, a memory capacity of several A4 pages and the whole lot capable of being self-powered for 20 or so hours. The president was captivated to the extent that the very next day Nishi found himself describing his dream to Kyocera's other directors. To cut a long story short, Kyocera decided to go ahead and make the machine. Microsoft landed the software contract and within a year found itself presenting the product design to Tandy Corporation.

Tandy decided to take the product on board and it became available as the Model 100 last March. But Tandy wasn't the only company to spot the advantages of such a useful machine. NEC in Japan felt that, with some design changes, it too would like to sell the machine. NEC's version, the PC-8201A, is slightly larger than the Tandy although it is still smaller than an A4 ring binder. One massive advantage of the NEC machine is that it can accommodate exchangeable, self-powered RAM cartridges.

My first impressions of the PC-8201A were entirely favourable. It looks smart in its restful colours of cream, mushroom and light brown. The keyboard is full size with a nice feel and the screen is very easy on the eye with its eight lines of forty fairly large characters. My wife liked it straight away and she's never admitted to even liking a computer before. It fits on your lap and can be used with ease on trains, although you may have to tuck your arms into your sides a bit during the rush hour. I'm not sure whether I should say this, but I have even used it in the loo.

Of course, like all machines, it has provoked the odd frustration. Like the day I was late for work and couldn't find the

darned thing, even with my glasses on. Like the day I tried to initialise a RAM cartridge and I zapped all my files. Right now I'm having a devil of a job trying to get it to talk to my printer. My overall impression though is that we're on the verge of something big, so to speak. It is as major a step for the industry as the introduction of the 'portable' computer a

cassette, and a Hewlett Packard bar code reader socket. Each of these ports has a neat, plastic cover which can be prised off with a biro. If your briefcase has as much rubbish in it as mine then I strongly recommend that you keep these covers in place. The 48 pin system slot is currently used for plug in RAM cartridges but from its name and various hints in the docu-

'One massive advantage of the NEC machine is that it can accommodate exchangeable, self-powered RAM cartridges.'

couple of years ago. I can't see Osbornes, Hyperions, Compaqs and Kaypros being called 'portable' for much longer. Transportable would seem more appropriate.

The main barrier to purchase at the moment is likely to be price. CMOS chips are used extensively and, at the moment, a 16k machine will cost you \$1095 (including sales tax) — but shop around, Grace Bros and Myer are selling it for \$995. RAM cartridges are a hefty \$482 each. Perhaps NEC should consider dropping the RAM cartridge price at the earliest opportunity because they do represent a major strength of this machine. Even so I can see the machine being snapped up by people on the move. Journalists, surveyors, hospital doctors and travelling salesmen spring to mind immediately as likely customers.

Hardware

The PC-8201A is a truly portable, lap-sized computer. It is self-powered and, with alkali batteries and a 16k RAM memory, it will run for around 18 hours. It sports a full-sized, 67 key keyboard and a display of eight lines of forty characters each. Alternatively, the screen can be regarded as a matrix of 64 × 240 individually addressable points. The machine's contact with the outside world is through seven ports including RS232, Centronics, DIN

mentation, I suspect that this could attach to a variety of external data storage peripherals in the future.

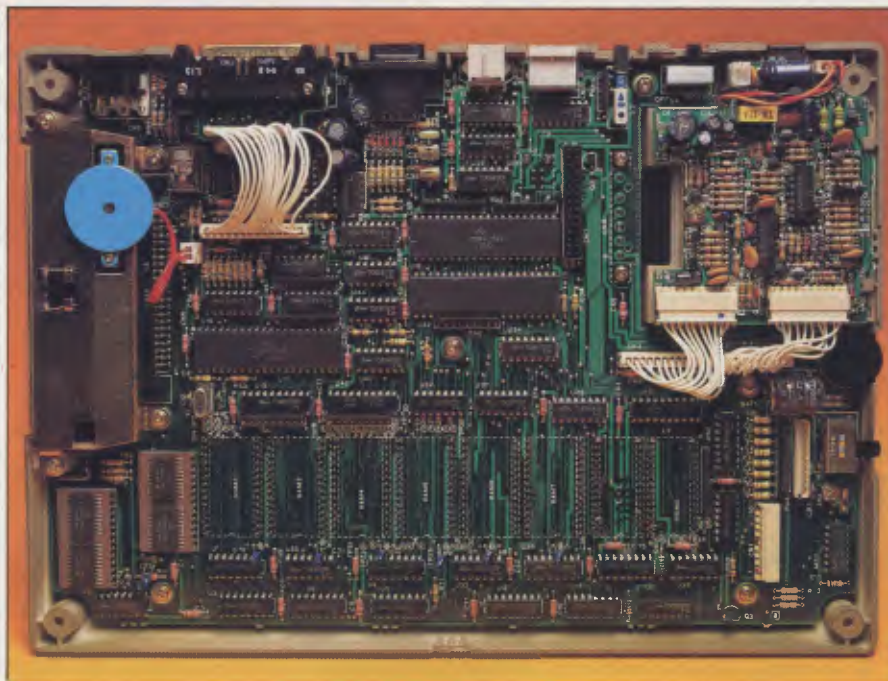
The memory of the PC-8201A is all battery-backed CMOS which means that all information stored within the machine is maintained as long as power is available. In the case of a 16k RAM machine an internal nicad (nickel-cadmium batteries) will keep the memory 'alive' for 26 days with no other source of power. For a 64k machine this figure drops to seven days. The machine contains a 32k ROM containing the operating system, Basic, Text and Telcom programs plus 16k of user RAM. In fact only 12k of this is actually usable because the operating system pinches some for itself. RAM memory must be expanded by your dealer. The sockets are accessible by taking a cover off the back of the machine. Next to these RAM sockets is an additional ROM socket into which you can plug an alternative ROM. The internal memory can be expanded up to 64k and the capacity of the external plug-in RAM is 32k. The memory is organised in 'banks', each of 32k of which two can be active at one time. Each bank can contain up to 21 separate files and banks 2 and 3 have a switch which protects their contents from being overwritten. Normally the ROM is active plus one of the RAM banks but it is possible to arrange things so that two RAM banks are active instead.



The NEC-8201A; Tandy wasn't the only company to spot the advantages of a useful machine.

The plug-in RAM cartridge, or RAM disk as I'm sure it will become known, caused no problems. Simply plug it into the system slot and perform a 'cold boot' by pressing SHIFT, function key five and CTRL. The 'cold boot' is rather like formatting a disk — it only needs to be done the first time you use a RAM cartridge. Since this is a highly dangerous procedure in the sense that if you mess it up you can easily erase the wrong bank, make sure that all your files in memory are safely stored away on cassette before initialising a new RAM disk.

The keyboard contains all the keys you might expect (QWERTY, CTRL, ESC, TAB, etc) plus a few others which are worth mentioning. A STOP key is a neater way of halting a program than Control-C which many of us have become used to. Control-C still works if you find that you can't break the habit. The Tandy has a pause key which suspends program execution; I find that switching off the NEC has exactly the same effect. When you switch on again everything carries on from where it left off. Five function keys give access to ten user definable functions and a neat cursor control cluster is arranged in a



The internal RAM can be expanded to 64k.

north/south/east/west formation. Insert, delete, graphics and backspace are reasonably conventional but the PASTE key is unusual. This allows you to retrieve a previously identified piece of text and literally paste it into your current document or program listing. The graphics key gives access to 93 graphics characters, 90 of which can be defined by the user. Another 35 user-defined characters can be accessed through the CHR\$ command in Basic. Like most computer keyboards these days, the keys automatically repeat if held down for more than a second. An unusual feature is that the two 'home' keys have little pimples on them to help you locate your fingers when touch-typing.

The screen is formed from a liquid crystal matrix and is fairly large; if the same character sizes were imposed on a conventional display, it would measure 38cm wide. Both upper and lower case characters may be displayed. The instruction manual advises you to avoid excessive pressure on the screen which is understandable since people will be jamming these machines into briefcases.

I had no trouble connecting the PC-8201A (isn't it a long-winded name?) to my two cassette recorders with the supplied cable. If you use a miniature tape recorder, you will need to buy one or two adaptors to make the 3.5mm jack plugs fit the tiny sockets. Alternatively you could splash out on NEC's own cassette recorder at \$138.

I have spent more hours than I care to remember trying to get the NEC talking to my printer through the RS232 interface. For some reason my printer does not send the right signals out through one of its pins and this rather confuses the NEC. My solution was to remove the RS232 board from the printer and use the Centronics port which worked perfectly well. My advice to you is to ensure that your dealer gets the NEC working with your printer before you part with your money. This problem isn't unique to the PC-8201A, the RS232 isn't quite as standard as some people would have you believe. I also tried to get the NEC talking to my SuperBrain but that, too, was unsuccessful in that the SuperBrain could talk to it, but I didn't have time to figure out why the SuperBrain couldn't hear the NEC. Again this is not at all uncommon and due in no small measure to my ignorance of the precise details of the version of CP/M installed in the SuperBrain, We did, however, have a dramatic success talking through a modem to a mainframe computer. All this implies that it is more likely to be my computer system (or me) causing problems rather than the NEC having any inherent weakness. A built-in TELCOM program allows you to vary the RS232 port configuration. Baud rate, bits per character, parity, stop bits,

handshaking and half or full duplex may all be defined. More precise details are given later in the explanation of the TELCOM program.

The PC-8201A can be powered by four size AA batteries. On a 16k RAM system, alkaline batteries give at least 18 hours operation. Alternatively you can buy a rechargeable ni-cad pack from NEC which gives 5.5 hours of operation. A transformer which gives 8.5 volts DC can power the machine directly and this will also charge the NEC ni-cad pack if present. In fact it will continue charging the ni-cad pack even when the machine is switched off. Recharging takes around 48 hours and the pack can take around 500 recharges before it needs to be replaced. I prefer to use Duracell batteries which cost around 30c per hour of machine use. They save an awful lot of messing around and give at least three times the duration of the other batteries.

Incidentally, our concept of 'on' and 'off' changes with this machine. In fact we stop only the processor when the machine is switched off and the act of switching on again simply lets the processor carry on from where it left off. All the memory is maintained by an internal rechargeable backup battery which needs to be replaced by the dealer after some two and half years. If this battery were used as the main source of power, it would only give around twenty minutes operation whereas on backup it will maintain a 16k machine for up to 26 days (seven days for 64k internal RAM). Make sure you remove the RAM disk when not in use, otherwise the internal

battery will be trying to keep that powered up as well. In order to maximise battery life, the machine switches off after ten minutes without a key depression. This does not apply when running a Basic program or TELCOM. This duration can be varied by a Basic command between one minute and 25.5 minutes. By now you must have guessed that the PC-8201A contains a clock which keeps track of years, months, days, hours, minutes and seconds. Two basic commands TIME\$ and DATES\$ give access to these values.

TEXT

This is a built-in program which gives many of the facilities of a wordprocessor. Text entry, cut-and-paste, amendment and sensible cursor controls are all provided in this easy to learn and easy to use little package. Cursor controls behave quite normally but if you use them with the shift key they move left and right a word at a time and up and down a screen at a time. TEXT always operates in 'insert' mode which means that text following the cursor position is moved to the right to accommodate new entries. The delete and backspace keys delete characters under and to the left of the cursor respectively. It seems impossible to lose data accidentally on this machine since deletion is always a deliberate act. The cut-and-paste facilities are unusual in a text processor of this size. You are allowed to mark any chunk of text and then either to cut it or copy it out of the document into a 'paste buffer' from which it can be read back into a new location. The



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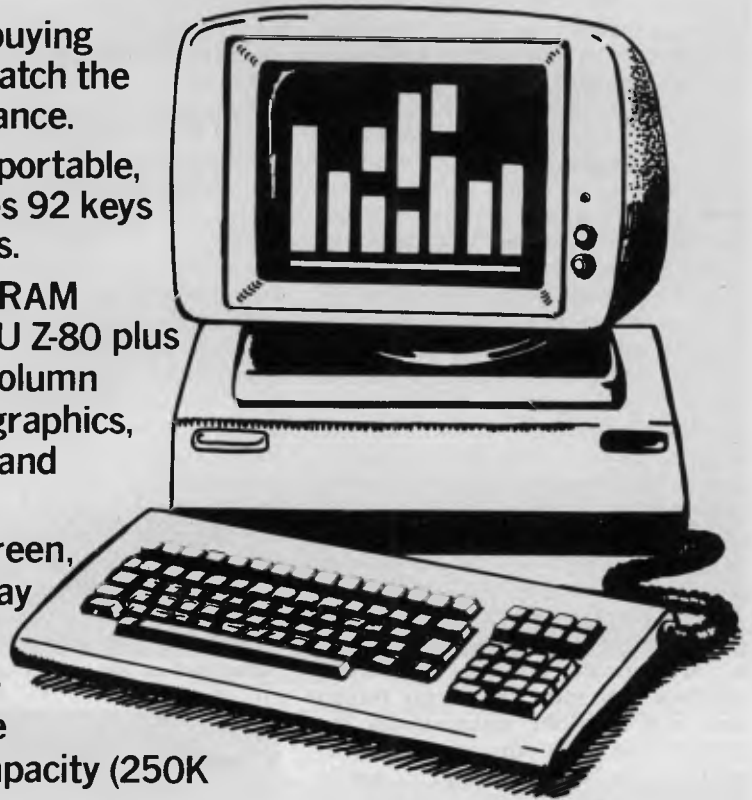
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contents of this buffer may also be retrieved when any program asks for an input from the keyboard. This can save messing around with sign-on messages when communicating with another computer, for example. Simply hit the paste key and call up as long a sign-on message as you need.

TEXT can also be used to create an 'IPL' file which is executed immediately the machine is switched on. IPL stands for Initial Program Loader. This goes even further than the paste buffer mentioned just now. You can list a whole sequence of commands in a file and the PC-8201A will execute each one before passing control back to the user. Just to see what would happen, I went into TEXT and typed 'BASIC' on the first line, a short Basic program on the next few lines, the word 'RUN' and then the word 'MENU' to return to the main menu. I switched off the machine and then switched it on again and everything worked. It loaded Basic, ran the program and returned to the menu. All the machine needs now is the ability to 'wake up' at a certain time and your middle of the night transmissions to America could be taken care of automatically. If NEC is compiling a shopping list of additional facilities, this is one that I would recommend. After all, it does have a continuously running clock so this should be possible.

Basic programs can be written in TEXT mode or in Basic itself. In fact a nice feature

to change anything on the destination equipment. In practice I had a few problems. (See my earlier remarks.) You may alter the values of a number of variables—communication speed from 75 to 19200 baud; parity—odd, even, none or ignore; word length, six, seven or eight bits; one or two stop bits; and two types of handshaking. Most of this is likely to be complete gibberish to a layman. This is why I think it is important to ensure that your dealer makes the PC-8201A talk to your existing equipment before buying. In addition to the configuration mentioned above, you may also choose whether to operate in half- or full-duplex mode. (Full duplex expects the receiving device to retransmit received information.) An Echo facility can be used to send all data received to a printer.

Operating system

This is the part of the built-in software which allows the user to execute programs and manipulate the files. It provides the following facilities: Erase a file (Kill); Rename a file (Name); Print the contents of a file through the Centronics port (List); Save a file to cassette (Save); Load a file from cassette (Load); Switch memory banks (Bank); Create an autostart file (Set IPL); and Stop a file being an autostart (ClrIPL).

'The PC-8201A is a truly portable, lap-sized computer. It is self-powered with alkali batteries and a 16k RAM memory.'

of the NEC is that you can switch between the two modes when developing a program so you have the advantage of being able to test bits of the program while at the same time having access to the more powerful editing facilities of TEXT. Having said that, I should say that the Basic text editing facilities are as good as, if not better than, most Basics. One last facility is the Search command which lets you search for occurrences of a chosen sequence of characters (up to 24). You may change the text and continue searching for the same string with the Next command. Unlike some fairly sophisticated wordprocessors, the search command rightly ignores the case of the letters.

TELCOM

TELCOM is the in-built program which allows you to configure the RS232 port for the printer, modem, computer or whatever you have at the other end. The theory is admirable: it allows you to connect to a wide variety of machines without needing

Whenever you are at the menu level of the operating system, you may load a program and its associated file simply by placing the cursor on the file name and pressing RETURN. If you put the cursor over a Basic file name, this has the effect of loading Basic, loading the file and then running the program. Alternatively, you may enter Basic more conventionally and then load the program file from within Basic itself.

Basic

As you might expect from MicroSoft, this Basic does not deviate to any significant extent from the company's standard MBasic except that it allows full screen editing which would be a welcome relief for those used to line editors. There are a couple of omissions such as WHILE . . . WEND and TRON . . . TROFF but nothing that upset me greatly except perhaps the absence of an AUTO line numbering command. By way of compensation N82 Basic, as this version is

called, has a few interesting additions. One instruction allows you to OPEN the RS232 port and others enable or disable interruption from it. ON COM GOSUB passes control to a subroutine whenever such an interrupt occurs.

Other commands exist both to place and detect the position of the cursor on the screen. PSET and PRESET set screen points on and off and SCREEN dictates whether function key labels (defined using KEY) are to be displayed. This Basic even lets you find out where the print head is positioned in the print buffer which must be very useful when trying to work out tricky print layouts. SPACE\$ lets you print a number of spaces, STRING\$ lets you print a character repeatedly.

SOUND lets you program music (ugh!) from a five and a half octave range and with notes from nought to five seconds duration. Machine language routines are now accessed from an EXEC command rather than from a CALL. And here's a mystery command — MAXFILES; it sets a constant in the operating system of the maximum number of files you will allow to be open at one time. I'm still trying to think why you'd need that one. POWER can be used to switch off the machine, to make it run continuously (not advisable if using batteries) or to set the power off timer.

One nice touch is that although the Basic has lost the AUTO line numbering, it has at least retained the RENUMBER command. Variable names look impressive at up to 255 characters long. Closer inspection reveals that N82 Basic will only allow variables whose first two characters are unique. Ah well, you'll just have to take a little care.

All in all I was quite satisfied with the Basic and know that programmers with experience of MBasic or any of its dialects will have few problems with this particular implementation. I was astonished to note that all the Benchmark timings were considerably faster than on the Tandy 100.

Applications software

A cassette and a manual of application programs were supplied with the PC-8201A. All of the programs were fairly simple affairs and many of them could best be described as make-weights. I'll give a brief note on each since they are supplied free with the machine:

Memory calculator. This makes the PC-8201A act like a calculator. It gives you addition, multiplication, subtraction and division, plus the ability to accept a string of 100 calculations, and allows you to edit it. A quick and dirty Basic program or a normal calculator are probably of more use to the average owner.

Text formatter. This is designed to make

NEC-8201 A

output to a printer look 'pretty'. You can define page size, margins, etc. It somehow contrives to split words unnaturally, duplicate others, screw up TABs and generally make an unprofessional job of things. It is better, however, than not bothering. I understand NEC in the USA has committed to publishing a formatter which

displays of performance are provided.

Linear forecaster. This one isn't bad. It accepts a sequence of historical data and forecasts values for future periods. Output is both numeric and in the form of very neat bar charts.

Loan evaluator. This calculates the missing variable of a loan given the other three. The four are principal, interest, repayment and period. Schedules may be displayed or printed. It's okay.

Character definition. If you need to define graphics characters then this program is fine. It gives you a large clear matrix

'Basic programs can be written in TEXT mode or in Basic itself. In fact a nice feature of the NEC is that you can switch between the two modes when developing a program.'

overcomes all these problems. Let's hope it turns up here. Done properly, it would be a really useful facility.

Investment portfolio. This might be considered useful if it weren't for the fact that all investment details have to be entered as a series of DATA statements straight into the program. It allows you to keep track of up to 50 stocks or other investments using purchase price and current market data. Printouts or screen

on which to construct your character and as you go along it also displays the developing character actual size. Sets of graphics characters may be stored for future use. I liked this one.

Bank backup and file transfer between banks. If they work, I like them. I didn't actually have a go.

Bank accessor. This theoretically allows concurrent access to other banks. Since I had only half of bank 1 operational and the

whole of bank 3, this could explain why it wouldn't work for me.

Terminal mode selector. To save the trouble of redefining the communications characteristics of your various devices — modem, printer, other computer, etc — this program stores a file of devices and their characteristics. Simply run it before using the RS232 port. It works and it's useful if you need to communicate regularly with several devices.

Bar code reader. I didn't have one of these so this software remains untested. The idea of running amok in my local supermarket with a NEC and a bar code wand does have a certain appeal. One day perhaps.

Music program. Why do people supply music programs for machines with piezo electric beepers? It's okay for the kids I suppose but largely irrelevant. This program lets you use the keyboard like a piano keyboard. It stores and plays back musical phrases you have concocted. It's not a bad approach really.

Tank game. My 12-year-old liked this one. I've got to take his word that it's good. I still don't understand the rules.

Snake game. I liked this one. My 12-year-old son didn't, probably because he couldn't beat it. Neither could I but I did feel I got close at times.

Each program occupied between 4k and 8k of memory so I would be pretty selective about which ones, if any, you commit to one of your memory banks. It would be nice to think that software authors will quickly wake up to the potential of this machine and get some independent products on the road. Sales and publicity will have to become more visible before this can happen. Apart from the formatter mentioned earlier, I don't know of any software offerings available or about to become available. If you simply want a notebook, a communicator and the ability to knock up, or get someone else to knock up, Basic programs then you're away. If you really need a spreadsheet then you're going to have to consider a vastly more expensive machine or wait for the relevant software to appear.

Documentation

Three manuals were provided — *User's Guide*, *N82 Basic Reference* and *Personal Applications Kit Guide*. Each is clear and pretty thorough except when I wanted to get down to the real detailed technical stuff. I definitely needed some sort of technical reference manual to help me figure out my RS232 connection problems. And now I come to think about it, I had to tune my tape recorder in by guesswork. The manual didn't tell what to expect to appear on the screen if things were/weren't going well. In fact the name of the program appears if all is going well. Apart from



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NEC-8201A

these reservations, I'd say the manuals are fine.

Prices

8201A	PC-8201A.....	\$1095 00
8206A	RAM cartridge	\$482.00
8294A	Centronics cable.....	\$50.00
8295A-N	RS232 cable-normal	\$47.00
8295A-R	RS232 cable-reversed.	\$47.00
8299A-6	6-pin Berg cable.....	\$9.70
8299A-8	8-pin Berg cable.....	\$10.90
8281A	tape recorder.....	\$138.00
8221A	thermal printer.....	\$226.00
8201-06	8k RAM chip (fitted)...	\$129.00

Many stores are selling it for \$995.

The PC-8201A price includes a soft vinyl case, three manuals, applications cassette and cassette cable.

All items are available for delivery now.

Subsequent to this review being written Tandy has dropped the price of its 8k model to \$899, so you might like to get the latest prices from the respective companies before purchasing. — Ed.

Conclusions

Well, the Japanese certainly did the right thing by pursuing CMOS and LCD technologies through their calculator activities. This machine brings together in one superb package the results of their endeavours. I can see a lot of busy people rushing out to buy one of these portable computers. They are the first truly supplementary computers we've seen. They can be used to great effect in conjunction with existing machines if you can get them talking to each other. My feeling is that the

Benchmarks

BM1	2.6
BM2	6.7
BM3	17.3
BM4	17.3
BM5	18.5
BM6	30.6
BM7	46.9
BM8	9.8

All timings in seconds. An explanation of the Benchmark programs is included in this issue.

Technical specifications

CPU	80C85 (CMOS 8085), 2.5MHz
RAM	16k expandable internally to 64k 32k plug in cartridges (RAM disks)
ROM	32k expandable internally to 64k
Display	8 lines of 40 characters 64 x 240 pixels 191.2 x 50.4mm LCD
Keyboard	67 keys, including five function keys (give 10 functions) and four cursor keys. Graphics character access via GRPH key.
External storage I/O	RAM disks (see above), Cassette (600 baud) Centronics, RS232, Cassette, H-P Bar code, 8-pin and 6-pin Berg sockets
Built-in Software	N82 basic TEXT — simple but good wordprocessor TELCOM — drives communications through the RS232 port
Applications	Calculator Print formatter Investment portfolio Linear forecaster Loan evaluator Schedule keeper Character definer Memory bank backup Inter bank file transfer Bank accessor Terminal mode accessor Bar code reader Music Tank game Snake game

NEC currently offers much better value for money than the competition—it costs less, sports more memory and has the undeniable advantage of the RAM disks. If you are the sort of person who needs mobile computer power then you will see your

productivity take a dramatic upward leap as a result of owning a portable computer. And at today's prices that must make the NEC PC-8201A a front-runner for your money.



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★ LOTUS 1-2-3

Rated No. 1 on "Softalk's" monthly rating of the best IBM PC software. With 1-2-3, you can be using your IBM PC in a surprisingly short time. Even if you've never been near one before. 1-2-3 instructs you right on the computer's screen in a friendly, helpful way, so you learn as you go along. Everything is in English, not code, so there's no new language to learn. There's even a special HELP key you can press to put special instructions on the screen if you can't remember what to do next. But for all its comforting ease of use, 1-2-3 is one of the most powerful programs available for the personal computer. It combines spreadsheet, information management and graphics all in one.

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★TIM III	Database manager
FAST FACTS	Personal filing and reporting package
PROKEY	Keyboard programming utility
SIDEWAYS	Vertical print utility
APL PLUS*PC	APL programming language for the IBM PC
★CROSTALK	Communications and terminal emulation program

HARDWARE

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MUSIC MICRO, PLEASE

*Synthetic music can both imitate conventional instruments and create unheard-of sounds.
Simon Tait explains how synthetic sounds are produced.*

Many microcomputers can produce sounds, varying from uninspired beeps and burps to fulsome fantasias. When the full power of a microprocessor is applied to sound generation, the result can be impressive — so how is it all done?

To answer that question let's take a look at what sound itself really is.

The analysis of sound

What we hear as sound is a variation of pressure-waves produced in the air by vibrating or moving objects. In a violin, for instance, vibrations set up in strings produce sound, and when we speak our glottis vibrates and these vibrations are passed in to the air.

An electronic synthesiser produces an electrical signal which, eventually, sets up vibrations in the cone of a loudspeaker, generating sound.

One of the most important principles of synthesis is that any repeating waveform can be broken down into series of pure sinewaves, each of different frequency (number of cycles per second), phase (relationship in time) and amplitude (strength).

Graphs may be drawn of the amplitudes of such frequency components, or 'Partials', against their frequency. Such a graph is called a frequency spectrum.

Fig 1 shows the frequency spectrum of a violin tone (or note) at a particular point in time.

If the waveform truly repeats then all the frequency components will be multiples of a basic frequency called the fundamental. In this case we can call these partials harmonics. The quality or 'timbre' of musical tones depends almost entirely on the amplitude of partials and not significantly on phase.

Musical instruments

Instruments such as the piano, guitar and violin family have vibrating strings to

produce the basic sound. When simple strings are secured at both ends, they can only vibrate in a distinct set of 'modes'.

Fig 2 shows the first few modes, each excited separately on the same string. Any oscillation of these strings will be made up of contributions from the various modes.

Now, every mode will have a different frequency associated with it so that
 $wavelength = \text{length of string} \times 2 / \text{mode number}$
 $frequency = \text{velocity of propagation} / \text{wavelength}$

Each of these frequencies has a harmonic relationship connecting it to the lowest frequency which is the fundamental.

Instruments like the woodwind and brass families depend on a vibrating column of air to produce sound. Like a string, a simple column of air can only oscillate in a distinct set of modes with corresponding harmonic partials.

The spectrum of the tone produced by a real instrument is more complicated than this simple analysis reveals. The relationships between partials and the fundamental are not always exactly harmonic, and sometimes harmonic type components don't really exist. For instance, the vibrations of violin strings are complicated by the bow which nearly always touches the string.

For each instrument the character of the sound is shaped by the way that the vibrations are started, and by the body of the instrument which changes the relative amplitudes of the harmonics.

Even for a particular instrument relative amplitudes will change as oscillations build up and decay.

During the initial phase of a note the frequency of partials will vary most, becoming more or less constant as time goes on. Variation in the frequency of a partial often takes the form of cyclic deviations above and below a particular value. This is called vibrato.

Cyclic variation called tremelo is also frequent in the amplitude of partials.

Synthesisers

Analogue: Analogue synthesisers work

on the principle that an electric voltage can be used to represent a sound waveform. Analogue electronic circuit modules such as oscillators, filters and modulators combine in an analogue synthesiser giving a complex system which can successfully imitate musical sounds.

Musicians have found the analogue synthesiser very useful as a versatile system that may be easily realised in analogue electronics. The versatility of the modern synthesiser is due to the concept of voltage control. Every module in the system accepts its inputs and produces its outputs in the form of a voltage.

So the outputs of any module may, within limits, be used as the input of any other module.

The analogue synthesiser uses subtractive synthesis — first creating a waveform rich in harmonics, then filtering the waveform to get something close to the required frequency spectrum.

Waveforms are generated by one or more voltage controlled oscillators (VCOs) which accept a control voltage and produce a waveform of frequency proportional to that voltage.

The keyboard of the synthesiser usually provides the control voltage for the VCO. A number of waveforms are useful and relatively easy to produce. These are shown in Fig 3 with their corresponding frequency spectra.

Another waveform often provided is 'white' noise, which gives a random or pseudo-random voltage output. The noise waveform will have randomly varying frequency components throughout the audio frequency range. This is useful in synthesising the initial portions of the sound of musical instruments, and for imitating a range of sounds from surf breaking on the shore to explosions.

Filters are used to modify the frequency spectrum of the waveforms produced by the VCOs and noise generators. If these are also voltage-controlled, it is possible to vary the frequency spectrum with time. A number of different filters may be provided; some typical filter characteristics are shown in Fig 4.

If the voltage generated by the keyboard



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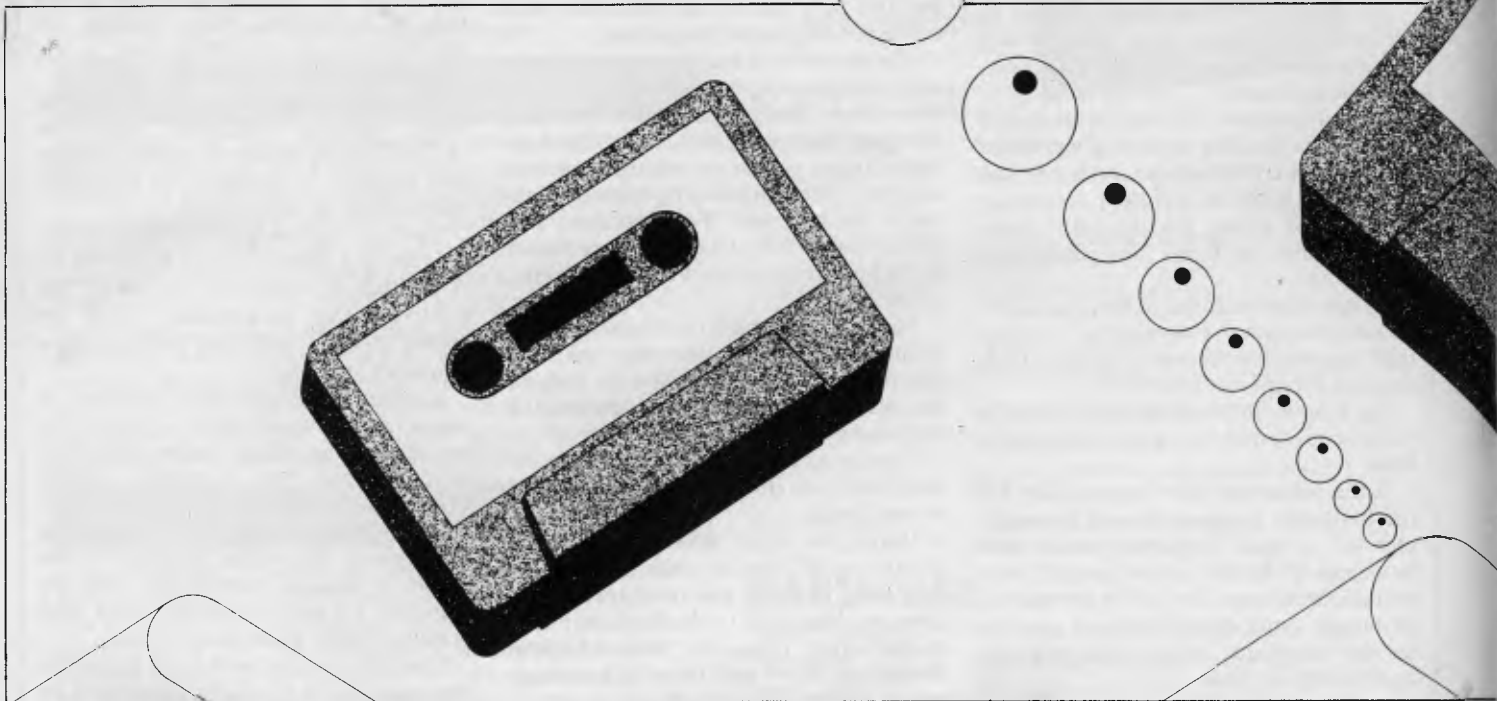


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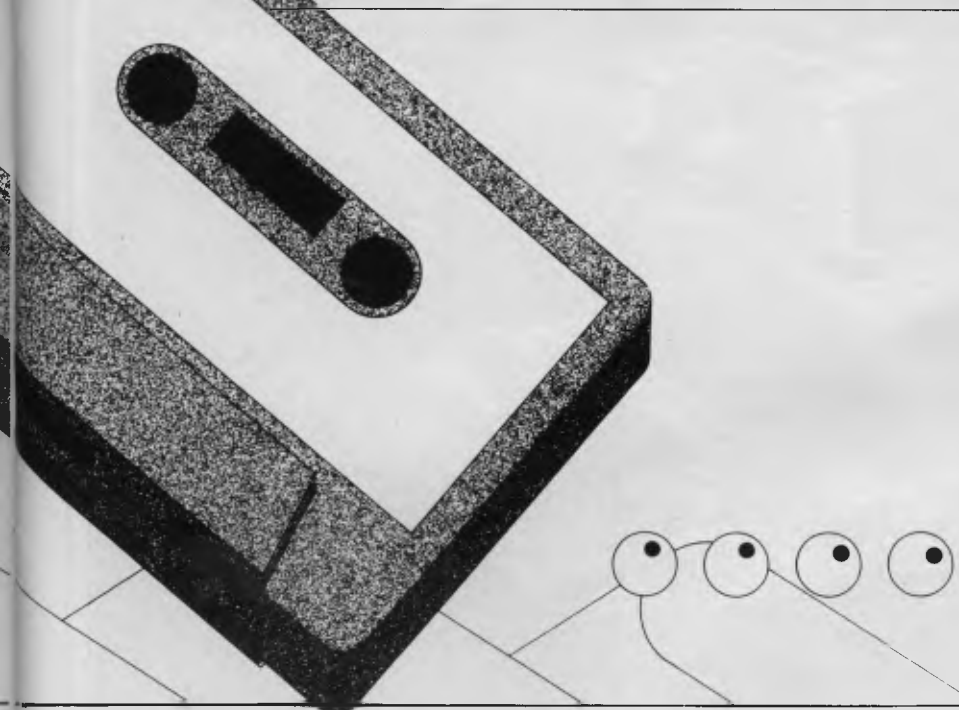
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is used to control the filter, the frequency response may be shifted up and down the frequency spectrum with the oscillator. In this case the correct relationships between the amplitudes of harmonics may be preserved, regardless of which note is being played.

The overall volume or envelope of a waveform can be tailored using a voltage controlled amplifier (VCA) driven by an envelope shaper. The envelope shaper can be programmed by the user.

The 'attack' phase of the waveform determines how the sound builds up initially; the steeper the rise in volume the more percussive the sound. The sound of a piano note has a very steep attack because oscillations are started by striking strings with a small hammer but the sound of a woodwind instrument has a much more gradual attack.

After the attack the 'decay' phase determines how quickly the initial peak dies away.

The 'sustain' part decides the volume of the relatively steady part of the note, and how fast it decays. Usually the volume remains at this point until the key pressed on the synthesiser keyboard has been released.

The envelope shaper waveform can be used to control a filter, and thus to control the frequency spectrum with time. For example, a low-pass filter could be controlled so that the loud part of the note generates higher frequency components.

Quite slow cyclic variation in the amplitude of waveforms are produced in the analogue synthesiser by use of a low frequency oscillator (LFO). The output voltage of the LFO can be added to the envelope shaper voltage to cause the tremolo effect described earlier.

Vibrato can also be achieved by adding the output of the LFO to the keyboard voltage to cause the frequency of the VCO to vary.

Modulation is another technique used to create complex spectra which do not necessarily have harmonic relationships connecting them. The output of an oscillator is applied to the input of a VCA and the output of a second VCO provides the control voltage.

The resulting output from the VCA is one waveform multiplied by the other.

We can determine the frequency spectrum of the resulting waveform by considering two sinewaves of frequency A and B:

A well known trigonometrical identity is $\cos(A) \times \cos(B) = \frac{1}{2} \cos(A+B) + \frac{1}{2} \cos(A-B)$

thus, two sinewaves are produced, representing the sum and difference of the two original frequencies.

Most analogue synthesisers are monophonic — they can only play one note at a time. To get an analogue synthesiser to

play more than one note all modules described must be duplicated to provide the same functions for each note played at the same time. This may mean up to eight modules, each with its allocation of oscillators, and so on.

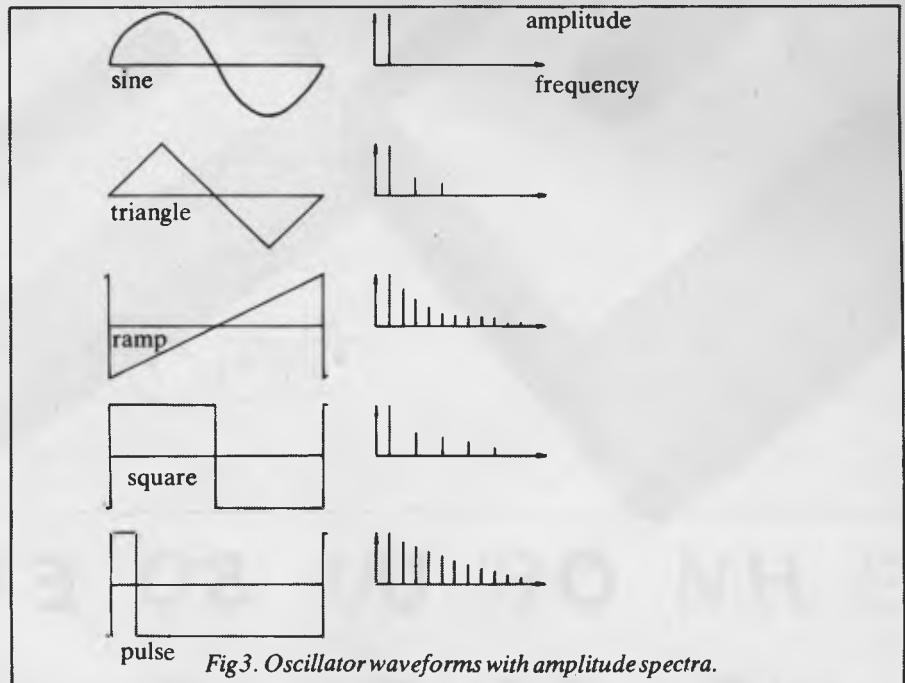
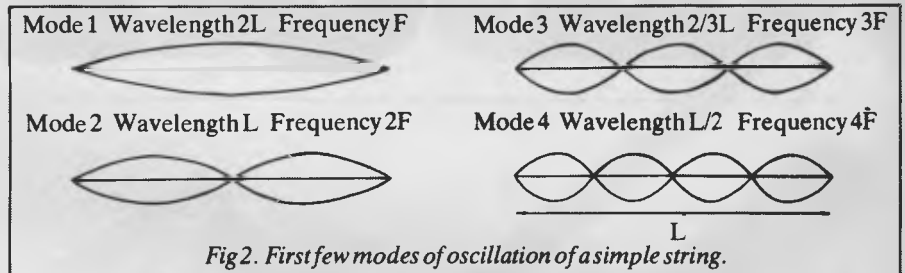
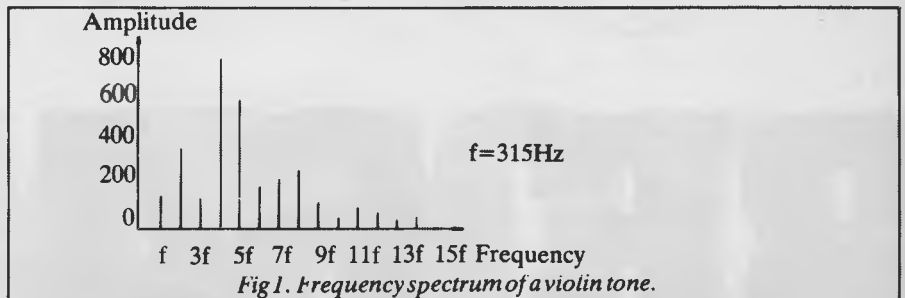
The number of controls needed on the front panel of the synthesiser can be enormous. On large synthesisers patch-cords are used to make electrical connections between modules. There is generally no way to store these settings and connections and to reproduce the required sound all such information must be known. In smaller synthesisers, the number of interconnections is limited by the switching of signals rather than the making of connections with patch-cords. This reduces the possible range of sounds that may be produced, but makes use easier.

Arbitrary control of the frequency and

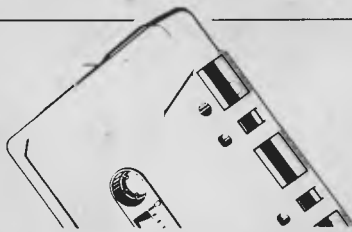
amplitude of frequency components is difficult on an analogue synthesiser and so imitating conventional instruments has been difficult. If the synthesiser has only a limited number of oscillators, partials will be limited to harmonic relationships.

Digital: Digital synthesisers depend on the fact that the sound waveform may be represented by (binary) numbers using mathematical manipulations to produce the required waveform. There is no fundamental limitation to the complexity of sounds that a digital synthesiser may produce.

In the past comprehensive digital synthesis in real time has not been practicable because digital electronics was just not fast enough. With the faster and more sophisticated hardware available now, digital synthesisers are just coming into their own.







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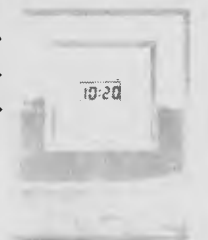
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MUSIC MICRO, PLEASE

The basic principle of digital synthesis is that a sound waveform can be sampled, or broken up into a series of values, each separated by an (equal) time interval.

Sampling theory tells us that if the waveform is sampled at least twice as fast as the highest frequency in the waveform, then little information is lost in the representation. If sampling is too slow, an effect called 'aliasing' occurs, and high frequency components are reflected back to lower spurious frequencies.

Samples can in turn be converted into numbers which may be represented in some convenient binary format.

The more bits included in each number, the more precise the value specified. The more precise the value, the less noise included in the representation of the waveform. By working on the assumption that the maximum error that will be incurred will have the effect of changing the least significant bit, we can deduce the 'signal to noise ratio' (SNR) imposed on the waveform.

In practice, eight bits per number is just adequate, 12 bits reasonable and 16 bits excellent.

Now, we must consider how much data we will be dealing with. The audio range extends up to a limit of about 20kHz, so to be safe we should choose a sampling rate of 50kHz; meaning 50,000 numbers per second.

Additive synthesis

Additive (or Fourier) synthesis involves producing sinewaves of correct amplitude for every partial in the desired waveform, and adding them all together. Of course there is no fundamental reason why analogue additive synthesis should not be

used, only that the VCOs needed for every partial are expensive to make and difficult to stabilise. In the main, the technique has proved inappropriate to the analogue world, just as the principles of analogue synthesisers have mostly been of little use in digital synthesis.

If an independent sinewave digital oscillator is provided for every partial, the frequency and amplitude of partials can be accurately specified. This information can efficiently be managed by means of a microprocessor. A convenient way of providing a number of independent oscillators is to time-division-multiplex some high-speed hardware.

This flexible and very comprehensive method of synthesis may one day be universally used. At present, the cost of necessary hardware makes it a little expensive.

Frequency modulation

We now turn our attention to another useful method of digital synthesis. This technique is based on the interesting results of allowing one oscillator to control the frequency of another.

In general, the result is a series of partial frequencies which are multiples of the ratio of one frequency to the other. If the frequencies are equal only harmonics are created. If the ratio is irrational then the frequency components will be inharmonic, or dissonant.

As the amplitude of the controlling oscillator is changed so the amplitudes of partial frequencies change in complex and interesting ways. They cannot, however, be made to vary in arbitrary patterns, and the technique is nowhere near as powerful as additive synthesis. It has been found

useful in synthesising brass and percussive sounds and needs less hardware than additive synthesis.

Microprocessors as digital synthesisers

Unfortunately, currently available microprocessors are just not fast enough to perform additive synthesis in real time. They have been extensively used, however, to control special purpose synthesiser hardware and to provide a sophisticated user interface.

There are also ways to get around the problems of additive synthesis which have formed the basis of successful musical instruments.

There is no reason why currently available microcomputers should not form the basis of synthesisers and there are indeed a few serious systems based on microcomputers now available.

We will now take a look at how software-based microcomputer synthesisers can be made to work.

As seen before, adding up the values of many sinewaves in real time is not possible. One answer is to form look-up tables which represent waveforms which have been synthesised in advance.

Unfortunately, the limited memory available for such tables means that the micro must step through each table a number of times. This means that we must limit ourselves to frequencies which are multiples of a fundamental frequency, ie, harmonics. It also means that we can only change the amplitudes of harmonics in steps.

With 8-bit microcomputers, one channel can be synthesised to quite high quality.

By adding some extra hardware to a microcomputer it is possible to produce a truly professional system based on these principles.

Until the microprocessor becomes fast enough to do all the work of synthesis it can be used to advantage as a versatile controller of analogue modules. One such application is in Casio's range of low cost preset polyphonic synthesisers. These use Digital to Analogue Convertors (DACs) coupled to a microprocessor, as well as analogue filters and a mixer.

An example of the use of a microcomputer as a controller is a system for the Apple II. On each card in this system there are three channels generated by conventional analogue techniques.

Such systems are attractive as they can perform extra functions apart from synthesis. It can transcribe music played on an organ type keyboard, will teach music theory, create, edit and store sounds, and act effectively as a digital 8-track recording studio.

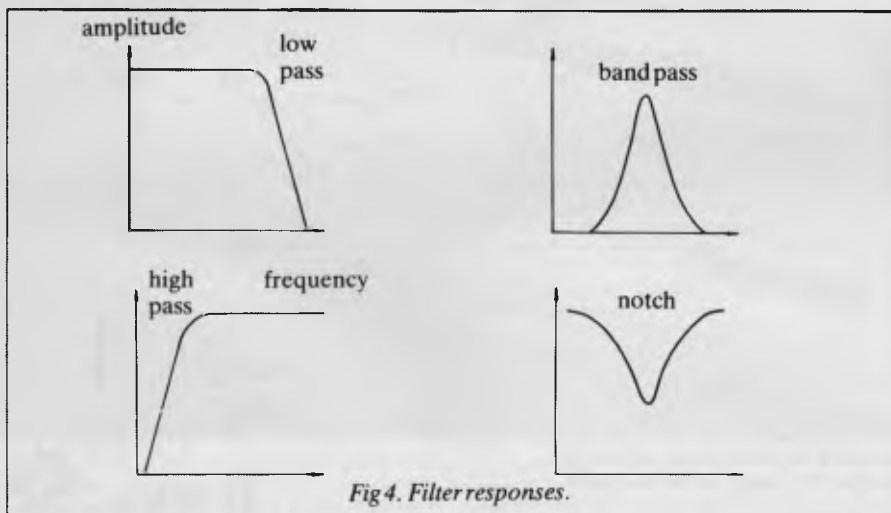


Fig 4. Filter responses.

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NEWCOMERS START HERE

This is our unique quick-reference guide, reprinted every month to help our readers pick their way through the most important pieces of (necessary) jargon found in APC. While it's in no way totally comprehensive, we trust you'll find it a useful introduction. Happy microcomputing!

Probably the first thing you noticed on picking up this magazine for the first time was the enormous amount of unintelligible-looking jargon. Well, in the words of *The Hitch-hikers' Guide to the Galaxy*, don't panic! Baffling as it may sound, the jargon does actually serve a useful purpose. It's a lot easier to say VDU, for example, than 'the screen on which the computer's output is displayed'. This guide is intended to help you find your way around some of the more common 'buzzwords' you're likely to come across in the pages of *APC*.

For those completely new to computing, let's start with the question: what is a microcomputer? We can think of a micro as a general-purpose device as opposed to a typewriter which can only be used for typing, a calculator to perform calculations, a filing-cabinet to file information and so on. A micro can do all those things and more.

If it is to be of any use, a general-purpose device needs some way of having a function assigned to it. We do this by giving the computer a set of logical instructions called a **program**. The general term for computer programs is **software**. Every other part of a microcomputer system is known as **hardware**. 'If you can touch it, it's hardware.'

Programs must be written in a form the micro can recognise and act on — this is achieved by writing the instructions in a code known as a **computer language**. There are literally hundreds of different languages around, the most popular of these being **Basic**. Basic is an acronym of **B**eginners' **A**ll-purpose **S**ymbolic **I**nstruction **C**ode. Although originally intended only as a simple introductory language, Basic is now a powerful and widely-used language in its own right.

Other languages you're likely to come across in *APC* include **Forth**, **Pascal**, **C** and **Comal**. These are known as **high-level** languages because they approach the sophistication of a human language. You'll also see references to the **low-level** languages, **assembly language** and **machine code**. We'll look at high and low-level languages in a moment.

The heart of a micro, the workhorse, is the **processor** or **Central Processing Unit (CPU)**. The processor usually consists of a single silicon chip. As with computer languages, there are a number of different types of processor around, the **Z80**, **6502** and **8088** being the three most common. The processor is nothing magical — it's just a bunch of electronic circuits. It's definitely not a 'brain'.

Being electronic, the processor's circuitry can be in one of two states: on or off. We represent these two states by **binary** (base two) notation, the two binary digits (known as '**bits**') being 0 and 1. It is possible to program computers in binary notation, otherwise known as **machine code** (or machine language) programming.

Machine code is called a low-level language because it operates at a level close to that 'understood' by the processor. (Languages like Basic are known as **high-level** languages because they are symbolic, operating at a level easily understood by people but not directly understood by the processor.)

Between high-level languages and machine code is a low-level language known as **assembly language** or, colloquially, **assembler**. This is a mnemonic code using symbols which the processor can quickly convert to machine code.

Since there is no binary equivalent of a comma or the letter 'a', for example, we need some sort of code to represent each character to be processed by the computer. In order to simplify communication between computers, a number of standard codes have been agreed on. The most widely used of these codes is the **American Standard Code for Information Interchange, ASCII**. This system assigns each character a decimal number which the processor can then convert to its binary equivalent.

There are two types of program to do this translation for us. The first of these is a **compiler** which translates our whole program permanently into machine code.

When we compile a program, the original high-level language version is called the **source code** while the compiled copy is called the **object code**. Compiled programs are fast to run but hard to edit. (If we want to change a compiled program, we either have to edit it in machine code (extremely difficult) or we have to go back to a copy of the source code.) For this reason there is a second translation program: an **interpreter**. An interpreter waits until we actually run (use) the program, then translates one line at a time into machine code — leaving the program in its original high-level language. This makes it slower to run than a compiled program, but easier to edit.

There are two strange-sounding Basic words you're likely to come across: **POKE** and **PEEK**. When you program in a high-level language, you are normally unable to choose which part of the machine's memory the processor will use to store things. This makes programming easier as you don't need to worry about memory locations, but slows down the program since the processor has to 'look up' addresses for you. Using the **POKE** command, however, you can 'POKE' a value directly into a desired memory address. 'POKE 1000,56', for example, puts the value 56 into memory location 1000. **PEEK** allows you to examine the content of a particular memory address. If you were to follow the above **POKE** with '**PEEK 1000**', the computer would respond by displaying the value 56. (**POKE**ing and **PEEK**ing is normally done to increase program speed. It's a compromise between Basic and machine code.)

So far, we have a processor and a program. Since a computer needs somewhere to store programs and data, it needs some kind of memory. There are two types of memory known as **Read Only Memory (ROM)** and the badly-named **Random Access Memory (RAM)**. **ROM** is so-called because the processor can 'read' (get things out of) its contents, but is unable to 'write to' (put things in) it.

ROM is used to store **firmware**, which consists of software permanently available on the machine. An interpreter is a typical example of firmware (stick with it: it gets easier!).

RAM differs from **ROM** in two important ways. Firstly, you can write to it as well as read from it. This means that the processor can use it to store both the program it is running and data (information). The second important difference is that **RAM** needs a constant power-supply to retain its contents: as soon as you switch the computer off, you lose your program and data.

Memory is described in terms of the number of characters we can store in it. Each character is represented by an 8-bit binary number. 8 bits make one byte and 1024 bytes make one **kilobyte** or **1k**. 32k, for example means that the computer can store about 32000 characters in its memory. If 1024 sounds like an odd number, remember that everything is based on the binary system, thus 1,2,4,8,16 ... 1024 being the nearest binary multiple to 1000.

There are numerous forms of **permanent** or **backup** storage, but by far the most common are the **floppy disk** and **cassette**.

Floppy disks or **diskettes** are circular pieces of thin plastic coated with a magnetic recording surface similar to that of tapes. The disk, which is enclosed in a protective card cover, is placed in a **disk drive**. Disk drives comprise a high-speed motor to rotate the disk and a read/write head to record and 'playback' programs and data.

The disk is divided into concentric rings called **tracks** (similar to the tracks on an LP) which are in turn divided into small blocks by spoke-like divisions called **sectors**.

There are two methods for dividing the disk into sectors. One method is called **hard-sectoring**, where holes punched in the disk mark the sectors, and the other is **soft-sectoring** where the sectors are marked magnetically. (The reason that disks from one machine

can't be read by a different make is that each manufacturer has its own way of dividing up the disk. Recently, however, manufacturers do seem to have begun to acknowledge that this situation can't go on forever, and they are working on making their disks compatible with each others.)

Since the computer needs some way of tracking the whereabouts of everything on the disk, we have a program called a **Disk Operating System**, more usually known simply as the **Operating System (DOS or OS)**. The operating system does all the 'house-keeping' of the disks, working out where to put things, letting the user know what is on the disk, copying from one disk to another and so on. As you might expect by now, there are lots of different operating systems available (each with its own advantages and disadvantages). The two most popular OSs are **CP/M** (Control Program for Micros) and **MS-DOS** (Microsoft Disk Operating System).

Floppy disks provide a reasonably fast and efficient form of secondary storage and are cost-effective for business machines. For home computers, however, the usual form of program and data storage is on ordinary cassette tape using a standard cassette recorder. This method of storage is slow and unreliable, but is very cheap and is adequate for games and the like.

Another type of disk you'll see referred to is the **hard disk**. This is an extremely efficient method of storing large amounts of programs and data. Hard disk capacity generally starts at around 10 **Mbytes** (10 million bytes) and rises to ... well, you name it. Besides offering a much greater capacity than floppies, hard disks are more reliable and considerably faster. They are, however, much more expensive than floppy drives.

Since computers need some way of communicating with the outside world, we need input and output devices. Input and output devices include all manner of things from hard disk units to light-pens, but the minimum requirement for most applications is a typewriter-style **keyboard** for input and a tv-like **Visual Display Unit** for output. The Visual Display Unit is variously referred to as a **VDU**, **Cathode Ray Tube (CRT)** and **monitor**.

The various component parts of a computer system (processor, keyboard, VDU, disk drives, etc) may all be built in to a single unit or they may be separate, connected by cables.

Take this paragraph slowly and it makes sense! When a computer communicates with an outside device, be it a printer or another computer, it does so in one of two forms — **parallel** or **serial**. **Parallel input/output (I/O)** requires a number of parallel wires. Each wire carries one bit, so with 8 wires we can transmit/receive information one byte at a time (8 bits = one byte, remember). **Serial I/O**, in contrast, uses a single wire to transmit a series of bits one at a time with extra bits to mark the beginning and end of each byte.

To enable different devices to communicate with each other in this way, standards have been agreed for different **interfaces**. An interface is simply a piece of circuitry used to connect two or more devices. The most common standard serial interface is the **RS232** (or **V24**) while the **Centronics** standard is popular for parallel interfaces.

When two computers want to communicate with each other over a distance, there are again two ways of doing it. Both methods use the public phone network. The simplest and cheapest method is to use a device known as an **acoustic coupler**. This simply plugs into your computer, and has a receptacle into which you place your telephone handset. However an acoustic coupler is slow and not exceptionally reliable.

A more sophisticated (and correspondingly more expensive) method is to use a **modem**. Unlike an acoustic coupler, a modem is wired into the telephone system and you should get permission for this from Telecom.

So, now you know!



SOFTWARE

Artistic Atari

Bob Chappell finds colourful creations at his fingertips thanks to Paint from Atari.

The caveman had his walls, the Egyptians their papyrus and Picasso his canvases. Perhaps you too have sometimes fancied yourself as an undiscovered genius with the camel hair. If so, and you own an Atari, you can forget about the walls, papyrus, canvases, linseed oil, brushes, palettes, easels and the rest of the paraphernalia. All you need is an artist's smock (just to get in the mood) and a copy of Atari's new program Paint. It won't guarantee you turn into a Gauguin but at least you won't get water-colour all over the three-piece suite.

Features

Paint has three main options: Super Paint, Simple Paint and Art Show. Super Paint lets you paint pictures using a variety of brushes, colours and textures. You can mix your own colours, choose the speed at which your brush paints, and can automatically draw circles, lines and rectangles. Whole areas can be filled with a selected colour and texture. A double-zoom feature takes you into close-up mode; the whole canvas is put under a microscope, allowing you to carry out fine brushwork on any portion of the picture.

Simple Paint is a cut-down version of Super Paint and is intended to get you started. Art Show allows you to save your creations to disk for later viewing. There are also a number of utilities together with a help screen and plenty of sub-menus. Virtually everything in the program can be controlled or accessed by the use of a joystick, although you can use the keyboard if you wish. You can also switch between them at any time.

Presentation

Full marks here. The package comes in an attractive box, the front of which shows a palette with striped and checkered paint oozing from some Atari tubes. On the reverse, Leonardo da Vinci looks a bit pained as he contemplates his completed Mona Lisa but appears a lot more satisfied

with the boat drawn using his Atari. Inside the box is the Paint disk and a 175 page spiral bound book.

Documentation

A large chunk of the book is devoted to a potted history of art, the instructions occupying only about 50 pages. It is well laid out and extremely easy to follow. Each facility is tackled a step at a time and each page shows both the commands for joystick and keyboard. There is no index, but as the commands are boldly headlined and explained in alphabetical order (apart from Circle, filed under O because it looks like one), this is no loss.

Other chapters in the book look at how a computer works, the history of painting, computer imaging and computer artists, and a chapter filled with ideas for subjects to paint. Although the book has a good number of photographic plates, some in colour, it doesn't include any pictures created using the Paint program.

In use

Selecting the Art Show option from the main menu causes the disk to whirr and a list of the saved paintings to appear. The disk already contains five: Boat, Winter, Sunset, City and Space. You can select any amount of pictures, in any order, and limit the amount of time they will be displayed. Having completed your selection the pictures will be displayed one by one and for as long as you have decreed. Pressing the space bar will halt the display at the current picture — a further press sets the show in motion again.

There are options in the utility section of the program for saving, recalling and deleting a picture from disk. All told, a very nice feature.

Simple Paint is a drastically cut down version of Super Paint and is meant to help you become familiar with the brush and paint.

Selecting Super Paint presents a black screen with a small cross in the centre —



Art Show: Winter.

this is your brush. At the bottom of the screen is a row of 10 pots (numbered 0-9) followed by two boxes, one with a large H in it, the other with a nest of diminishing squares inside.



Art Show: City.

Pot 0 contains black paint, the same colour as the background. This used to overpaint an area already coloured, and so erase it.

Pots 1-3 contain red, blue and yellow paint while pots 4-9 contain textured paint (striped, crosshatched, polka-dotted, checked — a colourful assortment).

Moving the joystick causes the brush (cross-sight) to move. When it is where you want it to be, holding the fire button down while moving the joystick will cause a trail of paint to follow in the brush's wake. For detailed work you need a smoothly moving joystick with good response as being too heavy-handed can easily ruin a good picture.

Changing colour is simple — the brush is moved above or into the required paint-pot, the fire button pressed and presto — you now have that paint. The texture pots work in the same way. Pulling your brush across the screen when it is loaded with polka-dot paint is a sight to behold.

The hue and brightness of a colour within pots 0-3 can be changed by placing the brush over the pot and pressing the fire button twice (the brush then sinks into the pot). Holding the joystick to the left and moving it up and down changes the hue — holding it to the right and pushing it up and down changes the brightness. You can thus 'mix' any colours you like. The only drawback to this is that any part of the

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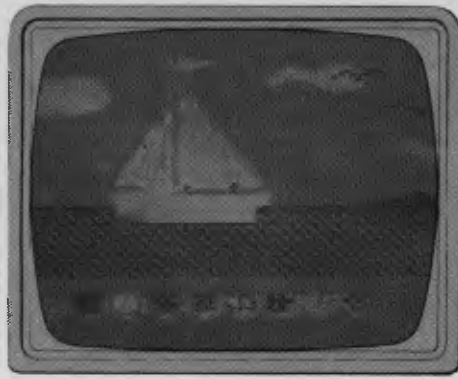
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Art Show: Boat.

picture already painted with that pot will change to the colour you're currently mixing.

Using the texture pots (4-9) is much more fun. Placing the brush over one of these and pressing twice on the fire button causes your masterpiece to be replaced by what at first seems a work of some new school of art. Your pots are still there but dominating the right half of the screen is a large sheet of multi-coloured, multi-textured material. A small white window sits over a tiny portion of this sheet — the windowed portion exactly matches the contents of your texture pot (which now has a flashing white bar beneath it).

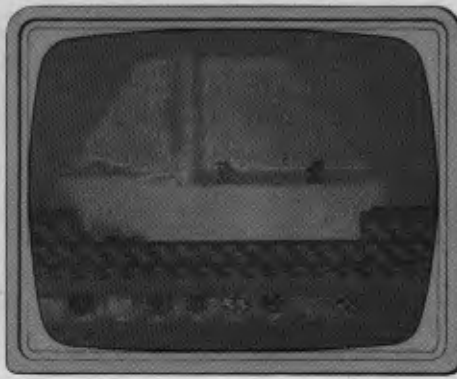
Above the sheet is a small square, on either side of which are two long rectangles. The right rectangle shows a swatch of the material currently covered by the window while the centre square is a greatly magnified version of the same piece. The left rectangle contains a swatch of the material already in your pot.

On first entry to this display, they all contain the same textured paint. Now comes the clever stuff. Moving the joystick makes the white window move around the sheet. As it does, the centre and right swatches change to show the currently windowed portion — the left rectangle still shows the original selection. Once the window is sitting over a section that takes your fancy, pressing the fire button fills your pot with it.

At this point, the left rectangle changes so that it shows a swatch of the new contents of the pot.

It may sound complex but it is actually very simple to operate — and completely fascinating.

On the same display but over on the left side, are two vertical strips, each made up of 16 bars (the 16 Atari colours available). A sort of bracket joins a bar from the left strip with one from the right. Holding the joystick over to the left or right and moving it up and down causes the strips (and current pot) to change their hue or brightness respectively. The number of different coloured and textured paints that can be obtained by using the texture sheet and hue and brightness controls is quite staggering.



Close up with zoom.

Pressing P (for Paint) takes you back to your unfinished masterpiece. Moving the brush to the H (for Help) box and hitting the fire button displays an index of options. These options are: Draw, Erase, Brush, Paint, Speed, Colour, Utilities, Fill and Help.

The Draw option lets you select from a sub-menu of line, rectangle and circle. Pressing the appropriate letter, or moving the joystick to that part of the menu and pressing fire, selects that facility. To draw the desired figure, the fire button is pressed twice.

For a circle, you fire at the points where you want the centre and circumference to be; for a line, at the beginning and end; for a rectangle, any top corner together with the opposite bottom corner. The figures are drawn instantaneously.

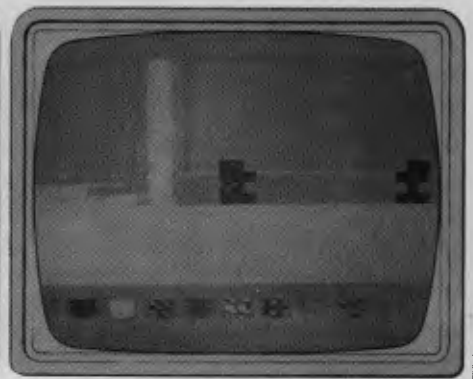
The Erase function wipes your picture from the screen. Selecting Brush lets you take your pick from any of 9 types of brush, each of which can be one of 9 widths, a generous choice. Speed gives you 9 rates at which to paint so you could use 9 for fast slap-it-on painting and switch to 1, say, for delicate work. Similarly, the Quick command allows you to move the brush about (when not painting with it) slowly or quickly, again at a setting of 1-9.

The Colour command switches you to the texture/hue/brightness display already mentioned. The Utility functions let you Keep (save), Junk (delete) and Get (recall) Pictures from a disk.

Fill gives you three methods of automatically filling an area with colour. You can fill a shape with the same (Fill) or different (X-Fill) colour as its boundary and you can I-Fill an area which has different-coloured boundaries.

Selecting the Help function (within the Help menu itself) supplies a complete list of the commands with brief descriptions. Pressing P at any time always returns you to your picture.

Finally I come to what I think is the best feature in the whole program, the ability to zoom in to a close up of any portion of your painting. Moving the brush onto the Zoom box and pressing fire causes the painting to be greatly magnified. As a result only a portion of it can be shown on the screen at



Still closer.

any one time. However, moving the joystick to any edge of the screen causes the whole display to scroll smoothly bringing the desired section into view. It's like moving a giant magnifying glass across your painting.

If the first level of Zoom does not produce enough magnification for your liking, another press of the fire button while poised over the Zoom box will increase it further. Another press takes you back to normal magnification.

At the highest level of Zoom, what was just a small corner piece of your entire painting will almost fill the whole screen. All the other functions are available to you while in Zoom so you can change brushes, colours, textures, etc and still carry on painting while the picture is magnified. This enables you to work some really fine and delicate detail into your painting. It is a marvellous feature, besides being good fun to play around with.

Verdict

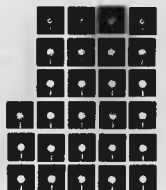
A really fun program, simple to use and completely user friendly. Those with little artistic ability may find they have more talent than they ever believed and will, in any event, obtain a great deal of pleasure from experimenting with the various features in the program.

Those who are already artistically gifted should find that Paint gives them a completely new field in which to express and develop their talents.

Paint is available from Atari outlets for \$99.95 and is suited to all Atari's micros.

RATING

Features
Documentation
Performance
User interface
Reliability
Overall Value



END

DYNAMIC DESQ

Integrated office systems are becoming all the vogue. First came Lisa from Apple, then Visi On from VisiCorp, and now a Californian company called Quarterdeck has launched DesQ, whose main advantage over its competitors is its ability to integrate off-the-shelf packages running under MS-DOS. Armed with this knowledge Robin Webster and Leslie Miner set out to evaluate the product's chances of success.

In true start-up fashion, a small US West Coast company called Quarterdeck is trying to find its own niche in the market for integrated software systems; a market which is currently dominated by such established names as Xerox, Apple Computers, and VisiCorp.

Quarterdeck's product, DesQ (pronounced 'desk'), differs from the others in that it is designed to integrate off-the-shelf packages that run in the MS-DOS environment. The idea behind this \$395 system is that many people might not be willing to give up the programs they know and love, or hate and have learnt to put up with, in favour of new products that they will have to learn from scratch.

Not surprisingly, DesQ is being pitched as an office automation product for a small to medium-sized business or for the departments within a large corporation. These are the type of users with which Quarterdeck founders, Therese Myers and David Pope, gained familiarity while developing an integrated workstation called the Axxa for the US bank, Citicorp.

The Axxa system was not a personal computer in the terms now familiar to APC readers. Instead, it was one of the initial attempts to bring many different office automation ideas together in one integrated system for use by executive vice-presidents and their staff and secretaries.

Problems occurred with Axxa because the level of integration was, in fact, not sufficient. To enable office workers to close down temporarily one document and look at another in order to find some specific information, the Axxa had been given an 'interrupt and resume' capability. The drawback was that the users had to memorise, or jot down, the details in one window if they wanted to make use of it in another.

According to Myers and Pope it was at that point that the importance of using multiple application windows became apparent.

'Simple split-screens are not enough,' said Myers. 'The user must be able to look at things simultaneously and obtain additional information spontaneously.'

Hardware requirements

One notable aspect about the new generation of true multi-window software environments (as opposed to just simple split-screen displays) is that they make full use of the current trend towards ever larger hard disks being tacked onto personal

language developed by Xerox at its Palo Alto Research Centre. SYMPL itself, however, was written in Pascal.

The user has the illusion of simultaneous access to diverse applications programs between 30k to 400k in size (by means of the various applications windows that can be left lying around on the metaphorical desktop). It is easy to see why 256k has become the realistic minimum for main memory and 512k a real bonus.

'DesQ is being pitched as an office automation product for a small to medium-sized business or for the departments within a large corporation.'

computers. With the Visi On system from VisiCorp, you really can't get away with less than an Intel 8088/6-based machine running MS-DOS and outfitted with 256k main memory, a 5Mbyte hard disk and a colour/graphics board.

Or, even better would be an IBM XT with an integral 10Mbyte hard disk. Apple's Lisa on the other hand comes with 1Mbyte of main memory and a 5Mbyte hard disk — although it is very probable that a 10Mbyte drive will be introduced in the near future. While the DesQ system can be viewed as a far less sophisticated product than the other two mentioned, it too, requires an IBMPC running MS-DOS with a minimum of 256k memory and a 5Mbyte hard disk.

The reason why such large amounts of storage are necessary has to do with the size of the so-called 'desktop-manager' code (128k of compiled C language code with Visi On, 2.5Mbytes of compiled Clascal code with the Lisa, and between 128k to 150k of code with DesQ).

DesQ was written in a language developed by David Pope. Internally the language is referred to as 'SYMPL', but Quarterdeck does not have the rights to use that name commercially. SYMPL is described as having attributes that can be found in both the Lisa list processing language much favoured by US artificial intelligence workers and the Smalltalk

Much early development work on DesQ was carried out on a Compaq system, which had been loaded up with the maximum amount of RAM. While this approach worked for basic development, Myers does not suggest that it would be at all suitable for users of the commercial system.

In addition to the usual personal computer paraphernalia, the DesQ user might want to buy a mouse to simplify the task of selecting commands from menus or manipulating windows and the data they contain, but, as we'll see later, a mouse is not an absolute necessity.

At the time of this review, Myers indicated that two mice were being recommended. The Mouse Systems optical mouse must be used in conjunction with a ruled aluminium pad laid on the 'real' desktop (this mouse will also be supplied with Visi On). The Microsoft mouse, apart from being a little noisy on certain surfaces, is said to handle well.

The system we reviewed was running on an IBM XT with a colour/graphics board and a colour monitor (although it could just as well be displayed on a black and white monitor). The Mouse Systems mouse was attached.

Using a mouse

In keeping with the Visi On approach,

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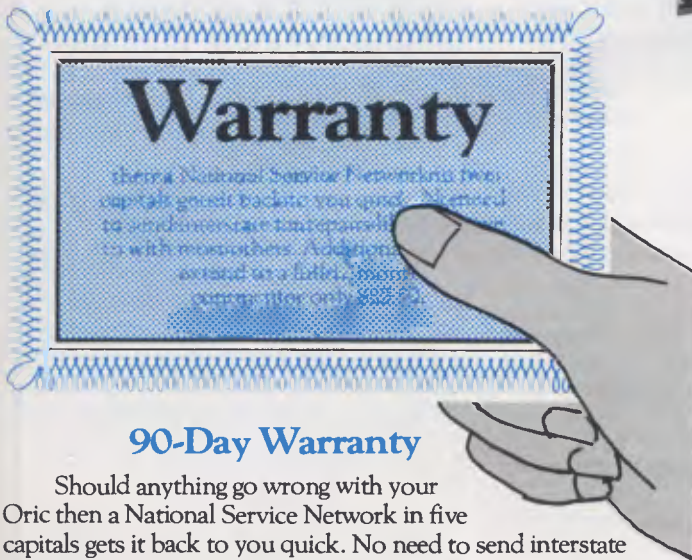
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Quarterdeck has decided to use a two-button mouse. In fact, most of the mice on the market have three buttons, but only the right-most two seem to be commonly used. The number of keys used generally relates to two things: the design philosophy of a software developer and the sophistication of the desktop-manager environment. In the latter case, the greater the sophistication, (and therefore the greater the amount of time spent by the software in checking the contextual implications of every action) the less complex a set of mouse button-pushes has to be memorised.

With DesQ the middle key is used to bring up the main menus — those menus which control the presentation and status of applications working within the DesQ environment — while the right-most key is used to select the options within those menus and then to go on and work with the contents of the applications windows themselves.

On the system under review, whenever the wrong button was used to select something (using the middle key to work on applications data, for example) the IBMXT had been programmed to alert the user by beeping. The fact that no error messages were displayed to indicate the exact nature of the problem was a little disappointing, but this may be corrected in the final version of the system.

In use

Since the fundamental idea behind DesQ is that it should have little or no direct effect on any applications program it handles, no 'basic' first screen appears. The user will encounter a different main menu from system to system. If a friend has Lotus 1-2-3, WordStar and dBase II then those are the applications programs that he can install and make available via DesQ. If someone else has one of the Easywriter family of wordprocessors, plus Supercalc, Multiplan and a Peachtree accounting package, these packages dictate the range of work that can be carried out.

DesQ's capabilities have almost nothing to do with the applications themselves. Having DesQ is rather like having someone who's an expert user of all the most popular software packages to do all the tedious work of, say, taking data from a spreadsheet and then retyping it into one of the wordprocessing environments, so that professional-looking reports can be produced.

It should even be possible to have DesQ do creative things like automatically handle all the manipulations between a database file, a spreadsheet, an accounting package and a wordprocessor. The user ends up with what is more or less a complete accounting/forecasting/reporting package built out of different software developers'

'The most apparent difference between DesQ and other windowing systems right now now is that colour can be used quite freely.'

products.

DesQ is a bit like super-glue — it can join all sorts of different off-the-shelf packages together, but it doesn't change the characteristics of the various components.

To install a new software application you must load the software onto the hard disk and then tell DesQ a few things about the package. First, you give the name by which the application will be known in the DesQ menu. Next, you type in the DOS command that will load it.

Then you give it a range of miscellaneous data, such as where the application name will appear on the main menu, how much memory it will require (DesQ checks to see if sufficient ROM is available and informs you if it isn't), whether it will use graphics, and what symbols will be used as delimiters during cut-and-paste operations.

The IBM XT under review was being used by Quarterdeck as a kind of test-bed system since its main menu boasted over ten of the popular software packages. These included WordStar, dBaseII, Easywriter II, Lotus 1-2-3, Peachtree accounting, Supercalc, along with Microsoft Basic and a freebie graphing system called Piechart which IBM puts on its PC-DOS distribution disks. The main menu is called up by clicking the middle mouse button twice. It always appears at the top right of the display and, as with all DesQ sub-menus, is always the same colour so that it may be easily differentiated from applications windows lying around on the screen.

Although we did not see the system running on a Compaq screen or a black and white monitor, Myers indicated that, even then, it was still quite easy to make the distinction. As an absolute indicator, DesQ windows *always* appear on top of any applications windows that have been previously opened. With Visi On and the Lisa system the user begins work by going to some central repository of information like the Services box (Visi On) or the ProFile icon (Lisa). The DesQ user, on the other hand, is presented with a fairly conventional main menu selection of programs (windows) to run (to open), as shown in Fig 1.

Since DesQ has been designed so that it can be used with or without a mouse, function key equivalents of mouse selections are given next to menu options (we will generally describe the way the mouse is used to manipulate windows and their contents). It should be noted that the line which says 'Other F10' is used to call up Part II of the main DesQ menu which will

OPEN NEW WINDOWS

Basic	F1
dBase II	F2
Easywriter II	F3
FastGraphs	F4
Lotus 1-2-3	F5
Peachtree	F6
Q/Link	F7
Supercalc	F8
WordStar	F9
Other	F10

Fig 1

have further program offerings.

Not all the programs shown were available to try — Lotus 1-2-3 and dBase II being notable absentees — so we worked with WordStar, Supercalc and IBM's Basic language program, Piechart.

To select WordStar from the DesQ menu we used the mouse to position the screen cursor so that the program entry was backlit. We then pressed the right-hand key on the mouse to 'select', or load, the program into memory.

DesQ offers a wide range of possibilities as to how any single applications window will look when it appears.

Windows may be set to occupy the full screen, the top or bottom half of the screen, the left or right half of the screen, a quarter of the screen, or whatever. Once a window has been opened it can then be further changed in size and location.

Window design

Those who read last month's review of the Visi On system will remember that we felt that the window manipulation technique adopted by VisiCorp was not as intuitive as it might have been. To move a window you had to redraw its outline at the target location by specifying its new upper left corner and its new lower right corner.

With the Lisa system, you just 'pick-up' a window and 'put it down' wherever appropriate.

DesQ's designers have decided on a window resizing system that is closer to the Lisa way of doing things. In fact, the window outline resembles those on the Apple product quite closely.

Once a window is displayed, you move the window by clicking the mouse cursor

DYNAMIC DESQ

once on the upper left corner, placing the cursor where you want the new upper left corner to appear, and then by clicking the mouse button again. The window outline and its contents are then re-mapped to the new location.

To scroll the contents of a window either horizontally or vertically, thin up/down/left/right arrows and small triangular graphics symbols situated on the window border are used. Placing the mouse cursor on a directional arrow and pressing one of the mouse select keys moves the window text in the relevant direction one line at a time.

Placing the mouse cursor on a triangle causes the text to jump in screenfuls (the kind of thing that's handy when you have your wordprocessing margins set well beyond the usual 75 to 80 columns).

The active window can always be readily identified (not as simple as you might think when you have four open windows, each occupying a different corner of the screen) because it is the one with the graphic symbols and a flashing number in the top left corner. These numbers indicate which window was opened first (ie, applications window '1' was loaded prior to applications window '2'). When a number of overlapping windows are displayed, the active window is *always* the one on top of the others.

According to Myers, however, these window border symbols will not be included in the commercial release of DesQ. Instead, the windows will just have more or less plain borders except for the top bar where the window name and number will appear (the name will probably be centred, defined by a line or two as in the Lisa windows).

Scrolling will be achieved by placing the cursor at definite areas within the window. Putting the cursor at the top of the window contents and pressing one of the mouse select buttons will cause the text to scroll upwards. Placing the cursor along the left side will cause the text to slide to the left (this is reminiscent of the 'pushing' method adopted in Visi On).

On the review system the bottom right corner of each window also had a small diagonal line within a ruled-off area. Lisa watchers will immediately recognise this symbol as a means of resizing a window without changing the position of its upper left-hand corner (the Lisa version is actually a tiny representation of the corner of a window and an arrow pointing down diagonally).

To resize a window with DesQ you place the cursor on the diagonal line, click once, and then move the cursor to the right and downwards (to enlarge the window area) or to the left and upwards (to shrink the

viewing area). There seemed to be no particular constraints as to what you could do with a window. Reducing a WordStar window to a one-inch-square rectangle didn't elicit any kind of negative response from DesQ. Neither did it mind when the same window was reformed into a tall, one-inch-wide column.

Generally, the window-handling seemed to be quite good, and certainly of the standard you would experience with Visi On.

The most apparent difference between

cannot be chosen for the text and background in a single window. Just as you have to reset many computers after altering system defaults contained in printer drivers and communications packages (otherwise the system would still follow the previous defaults regardless), you must tell DesQ that you are 'finished' or 'done' to confirm any changes made while in the Layout Window menu. If you don't wish to carry through the changes you have made, you can also select the 'Cancel Actions' option.

'DesQ is a bit like super-glue — it can join all sorts of different off-the-shelf packages together, but it doesn't change the characteristics of the various components.'

DesQ and other windowing systems right now is that colour can be used quite freely. In fact, all the windows on the screen (except for the DesQ environment windows mentioned earlier) can be coloured by the user.

To change the colours you call up the 'Layout Window' menu. This contains options that will alter the way DesQ controlled applications appear to the user.

There are commands to resize, change colours, move windows and set windows aside on the desktop — that is, to close the windows temporarily in the form of small rectangular icons at the bottom right of the display. Windows that have been set aside are kept intact in a memory partition; they do not have to be loaded from disk again. A mouse can be used to make the required selections, or the indicated function key pressed. The 'Change Colours' command has been implemented in a very straightforward manner. The lower portion of the Layout Window menu is taken up with three colour palettes — one palette for the application program text, a second for the background colour in the window and a third for the overall background colour of the display.

By selecting colours from these palettes it is possible to come up with some unusual, but pleasant working combinations. It is also possible to come up with many that are atrocious. Yellow text on a purple background is one unhappy combination.

Another problem that became obvious during the review is that DesQ will gladly let you make the text colour the same as the background colour (white on white or red on red), and vice-versa. The result, needless to say, is the computer equivalent of invisible ink — there's data in the window, but you just can't see it.

This is obviously not a major criticism, but it really wouldn't be a big task to link the two palettes so that the same colours

Zoom and View

Current wisdom among those who design such systems is that most users will not actually have 25 open windows on their desktops. Instead, they will work with their wordprocessing or spreadsheet systems as full screens and only when the time comes to do data transfers or to compare visually various files will smaller windows be used. To this end, Quarterdeck has included the 'Zoom' and 'Unzoom' commands. Zoom enlarges windows to full-screen, while Unzoom returns them to their previous size and location.

But with some programs, notably Lotus 1-2-3 and Supercalc, program data is written directly to the screen, bypassing DesQ's ability to tinker with usual program display modes. The result is 1-2-3 and Supercalc can only appear to the user as full screen applications — none of the usual window commands can be applied.

During the review, we opened up some WordStar files and then selected Supercalc from the main DesQ menu. The initial Supercalc screen totally obliterated the WordStar windows — they were still 'underneath' but to all intents and purposes not available until the Supercalc full screen display was removed. This is something of an annoyance since the real bonus of multi-window systems is simply that multiple windows can be arranged on a desktop and be made to share data by means of cut-and-paste operations.

To overcome this problem, Quarterdeck is developing a feature called 'View' which will intercept screen data generated by these rogues and make them obey window manipulation instructions. This function was not available at the time of our visit, so we cannot comment further on it.

Data transfer and learning

Transferring data from window to window, or more accurately from program to program, with DesQ follows the general conventions of block moves. If you've moved blocks of text around with WordStar or some other text editor then you will have no trouble.

One test we carried out was to see how DesQ would handle the interaction between Supercalc and IBM's freebie Piechart program.

First we selected Supercalc from the main menu and then typed in the name of the file we wanted to load. At this point, DesQ was really quite dormant and Supercalc was in complete control. It turned out that the file we had loaded had a number of columns of numerical data — the usual sales figures information.

Next, we called up the DesQ menu which contained the 'cut-and-paste' options. Selecting 'cut' marked the beginning and the end of the block we wanted to transfer by placing the cursor at the relevant spots and pressing one of the select buttons on the mouse. At that point, the Supercalc window became irrelevant to what we were doing and we opened up the Piechart window (it, too, is another one of those programs which appears full screen). Selecting 'paste' from the DesQ menu, all that remained was to place the cursor within the Piechart screen and click the mouse button once.

The resultant display was of a rather good four-colour pie-chart.

By thinking of DesQ as if it were an 'expert user', it will be easier to follow the way in which the system handles data transfers. According to Myers, DesQ handles the Supercalc to Piechart transfer by 'going through all the commands that Supercalc would have to go through to do the transfer'.

If you watch the screen closely during a transfer, you can in fact see the various command strings being automatically generated and put into effect. It's similar to the automatic program loading sequences (file paths) and macro commands that you can set up with MS-DOS version 2.0. Taking, say, a dBase II file and editing it with WordStar has always been possible, so long as you go through the tedious routine of converting the dBase II file to ASCII format first.

This is really where DesQ can be of benefit. During transfers, DesQ is designed to make comparisons between the various file formats that may be involved and also designed to handle the necessary transformations. The ASCII format and the DIF, or Data Interchange Format (as developed by VisiCalc creators, Software

Arts) can be dealt with by the system as a matter of course, but if problems are encountered because the formats are too dissimilar, it will 'do the best it can'.

Currently, DesQ is said to be able to handle transfers between IBM's Piechart and Supercalc, WordStar and Supercalc, WordStar and WordStar, Lotus 1-2-3 and WordStar and dBase II and WordStar. We

ity would be *the* big bonus to users.

Due to the limited time we had access to the IBM XT it was only possible to observe the Learn feature doing something very simple.

After opening up a WordStar window we loaded a test file and then went to the DesQ menu containing the command Learn. After selecting this option we



'DesQ is said to be able to handle transfers between IBM's Piechart and Supercalc, WordStar and Supercalc, WordStar and WordStar, Lotus 1-2-3 and WordStar and dBase II and WordStar.'

must assume that most of these are verifiable, if the examples we worked with are representative.

While VisiCorp has fallen behind with its 'Scripts' feature on Visi On (this is meant to allow users to set up command files that automatically carry out routine tasks), Myers explained that she felt DesQ's somewhat equivalent 'Learn' facil-

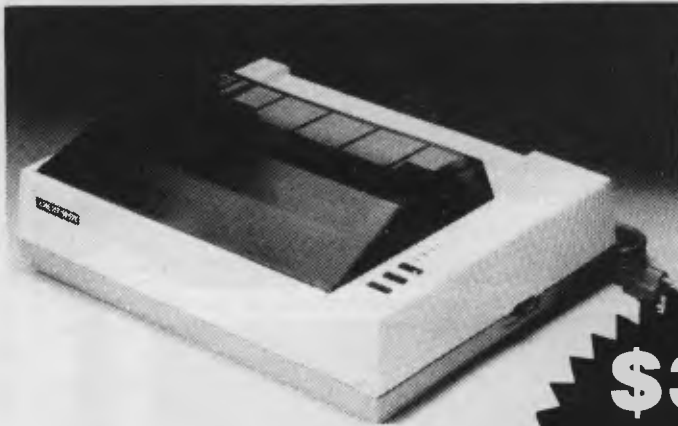
ited the menu and returned to WordStar. The test file already contained a fair amount of text, so we decided to see if we could teach the DesQ system to insert automatically a specific set of words whenever a particular function key was pressed.

We typed in the words 'This is DesQ' and then returned to the DesQ menu to select

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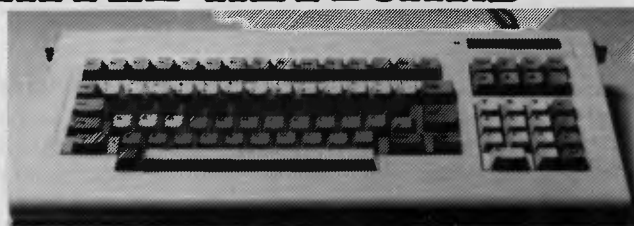
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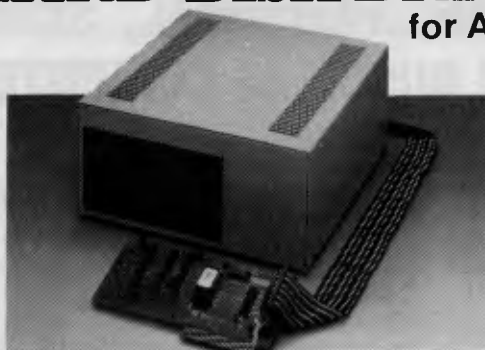
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the command 'Done', meaning that those three words were all that had to be noted. The cursor was then placed at random positions within the WordStar text and function key F5 was pushed repeatedly. With every depression, DesQ automatically inserted the words 'This is DesQ' in the document. In a spreadsheet, the same method could have been used to change a group of totals by 10%.

A more novel application of this power is when it is used to create sophisticated links and command structures between diverse software packages. Myers sees customers developing their own personal month-end reporting or accounting systems in this way, for example.

The future

It remains to be seen how well DesQ will perform in the business environment where all types of weird and wonderful programs lurk.

There are many, many programs on the market which are absolute failures. With these, software crashes occur in direct relationship to how important it is to the user that they don't crash. It also typically looks like the programmer's kid brother wrote the documentation on a Petite typewriter.

Surprisingly, these programs continue

to be used by customers, instead of being returned immediately — and they will undoubtedly be among those products that will be installed on a DesQ system.

When asked what would happen if a user had a number of applications program windows open and there was a single software product failure, Myers responded that DesQ 'would probably crash'. If that's the case, then the fate of all the unsaved data in the memory partitions is uncertain. In order to avoid complications of this sort at an early stage in the marketing of DesQ, Quarterdeck is putting a very strong emphasis on the development of what it calls 'agents' for the 10 or 15 best-selling packages on the market.

These agents will essentially be intelligent front-end programs that allow DesQ users to bypass what may be quite complex commands by going to a special menu and making mouse or function key selections.

Conclusions

There is no doubt that the future looks quite good for DesQ so long as a few rough spots are smoothed out (there is no way to undelete files as with Lisa and Visi On, for example, although this capability can be approximated by the addition of a disk doctor type program).

At \$395 (plus the cost of extra RAM, a hard disk, and maybe a mouse), it is certainly very competitive with a product such as Visi On.

It's not that DesQ is as sophisticated as the VisiCorp product — because it isn't; nor is the price difference that important. It really comes down to the fact that there are a lot of people already using products like VisiCalc, Multiplan, 1-2-3, WordStar, Peachtree accounting systems, and dBase II. They've paid a price, both in the financial sense and in terms of an effort to learn how to use their purchases. These users are unlikely to want to switch to the VisiCorp applications just to get the benefits of the Visi On desktop. For this reason, DesQ should be a success.

Specifications

Product name: DesQ.

Purpose: Integrates off-the-shelf software packages.

Developed by: Quarterdeck Office Systems, Santa Monica, USA.

Price: \$395

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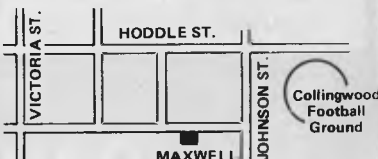
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CHECK YOUR DIGITS

The problems of accurate data entry were highlighted recently by the Korean airliner tragedy: one theory entertained by investigators was that the pilot input the wrong coordinates to his navigation computer. Here Michael Grose explains how check digits play a part in our everyday lives and provides you with a Modulus 11 Check Digit Calculator to type in and run.

In the early days of automation a South African bookseller is said to have sent an order to an American publisher for one copy of a book to be delivered direct to his customer quoting order number 1819. In due course the customer was rather taken aback to find on his doorstep thirty two mailbags containing 1819 copies of the book quoting order number 1. Numeric references are convenient for data entry and processing but they have the big disadvantage that, lacking the redundancy of natural language, they are less meaningful than words to most people.

As a result some modern systems use alphabetic reference codes. A notable nursery's catalogue has, for example:

LILIUM pardalinum giganteum LIPGIG
regale LIREGA
tigrinum fortunei LITFOR

where the derivation of the reference from the name is obvious, and therefore carries more meaning to everyone who has to deal with it than, for instance C208510036.

But numbers remain convenient for data entry: a calculator-style keypad is faster than a keyboard and leaves the left hand free to manipulate the input documents. The normal practice, therefore, is to add a check digit to the reference number, which will detect almost, but not quite, all mistranscriptions or miskeyings. There are many check digit schemes, but they all share the general principle of a digit by digit calculation on the base number giving a single-digit result which is appended to the original number. If a digit is altered or transposed then the result of the calculation, and hence the check digit, changes. It is thus a smaller analogue of checksum calculations on whole messages.

An illustration of the use of check digits, which can be based on published information and thus does not compromise the security of anyone's financial transactions, is the ISBN (International Standard Book Number) which is printed in practically every book these days. Its relative, the International Standard Serial Number, is carried by many magazines (see APC). This began over 15 years ago when a large newsagent was planning its new computer-controlled warehouse and required a unique identifier for every item that passed through it. At the same time some publishers were beginning to

adopt various numbering schemes for their own titles to help with their own systems. In the event a trade-wide agreement on a nine-digit Standard Book Number was reached. It was to have three parts: a publisher prefix, a title number, and a check digit. The prefix and the title number were both of variable length within the overall limit of eight digits and this solved the problem that some publishers are much more prolific than others. The nineteen largest were given prefixes 00 to 19 (with HMSO taking two, 10 and 11). This allowed them up to a million titles each. The next group had three-digit prefixes, 200 to 699, with room for 100,000 titles; four-digit prefixes were 7000 to 8499, down to seven-digit prefixes from 9500000 onwards for very occasional publishers with space for only 10 titles each.

The check digit is calculated modulus 11. That is to say that each of the eight digits of the base number is given a weighting:

digit: 1 2 3 4 5 6 7 8 c/d

weight: 9 8 7 6 5 4 3 2 (1)

When each digit is multiplied by its weight the sum of the products, including the check digit, whose weight is 1, is exactly divisible by 11 in a valid number. Thus the check digit is calculated by summing the products of the eight digits of the base, dividing by 11 and subtracting the remainder, if greater than 0, from 11. This immediately leads to a problem: the check digit must be a single digit if the number is to be nine digits long, yet one in every eleven numbers will have a remainder of 1 and a check digit of 10. The answer (this was in the days before hex) was to use the letter X, the Roman numeral for 10, and this solves the problem at the cost of some inconvenience in programming, and a stretch to a different part of the keyboard for the one number in eleven that has an X.

The current ISBN scheme is an extension of this. An extra digit, weight 10, is added at the front to indicate the origin. Thus all ISBNs have 10 digits, and French ones begin with a 2, German with a 3, while

```
10 REM [CHECK DIGITS] Version 1.0 of 27.viii.83
20 OPEN#0,0,"L": REM Set 80-column screen & clear it
30 ??:??:??:??:TAB(30);"C H E C K   D I G I T S":??:??:
40 ??"This program provides an example of how a general check digit subroutine may
50 ??"be used in a variety of check digit schemes. Enter an asterisk, '*', in place"
60 ??"of a number to reset.":??:??:
100 INPUT("Enter 1 for ISBN type number, 2 for C20 type number, 3 to stop : ")OP
110 IF OP=1 THEN FC=1: WE$="X98765432": GOTO 150
120 IF OP=2 THEN FC=2: WE$="078463521": GOTO 150
130 IF OP=3 THEN 900
140 GOTO 100
150 INPUT("Enter 1 to assign c/d, 2 to validate number, 3 to reset : ")OP
160 IF OP<1 OR OP>3 THEN 150
170 ON OP GOTO 210,310,100
200 REM Assign check digit
210 INPUT("Enter length of Base Number (up to 9 digits) : ")N
220 IF N<1 OR N>9 THEN 210
230 WE$=RIGHT$(WE$,N)
240 ??"Enter a";N;"digit number";: INPUT(" : ")TE$: IF TE$="" GOTO 150
250 IF LEN(TE$)<>N THEN 240
260 GOSUB 1000: IF CD$=CHR$(255) ??"Error": GOTO 240
270 ??"Number with check digit = ";TE$;CD$: GOTO 240
300 REM Validate Number with check digit
310 INPUT("Enter length of Number (up to 10 digits) : ")N
320 IF N<1 OR N>10 THEN 310
330 WE$=RIGHT$(WE$,N-1)
340 ??"Enter a";N;"digit number";: INPUT(" : ")OP$: IF OP$="" GOTO 150
350 IF LEN(OP$)<>N THEN 340
360 TE$=LEFT$(OP$,N-1)
370 GOSUB 1000: IF CD$=CHR$(255) ??"Non-numeric characters present": GOTO 340
380 IF CD$=RIGHT$(OP$,1) ??"Valid": GOTO 340
390 ??"Invalid. C/D for ";TE$;" is ";CD$: GOTO 340
900 END
1000 REM [CALCULATE CHECK DIGIT]
1010 IF NUM(MID$(TE$,FC)) = 0 THEN CD$ = CHR$(255): RETURN: REM Error check
1020 SU = 0
1030 FOR I = FC TO LEN(TE$)
1040   IF MID$(WE$,I,1) = "X" THEN SU = SU + VAL(MID$(TE$,I,1))*10: GOTO 1060
1050   SU = SU + VAL(MID$(WE$,I,1)) * VAL(MID$(TE$,I,1))
1060   NEXT I
1070 RE = (SU/11-INT(SU/11)) * 11: IF RE = 0 THEN CD$ = "0": RETURN
1080 CD = 11-RE: IF CD > 9 THEN CD$ = "X": RETURN
1090 CD$ = CHR$(CD+48): RETURN: REM [END CALCULATE CHECK-DIGIT]
```

CHECK YOUR DIGITS

Anglo-American ones now begin with a zero, the only digit which could have been added to an existing SBN without affecting its check digit.

In practice the same routine can be used both to calculate a check digit for the first time and to validate a number which already has one by comparing the result of a fresh calculation on the base number with the check digit as given. If the two do not match then there has been an error, and the ISBN scheme is said to 'detect virtually all transposition errors, and transcription errors involving the use of a completely erroneous digit. Detection of entirely random error is well above 90 per cent.' Other weights are possible and produce different results. There are of course many possible routines, but the one presented here has the advantage of generality: it can be used for various modulus 11 schemes just by varying the weights.

On entry it expects:

- 1: the base number as a string of digits in TE\$ (or Test String);
- 2: the weights to be applied to each digit as a second string of digits (+ × for 10) in WE\$ (Weight String); and
- 3: the position of the first significant digit in FC (First Character). This allows for the use of an alphabetic prefix as in C208510036 quoted above. If this is done the WE\$ must have a weight for each skipped character to keep the two strings in line even though they are not used in the calculation.

On exit CD\$ (Check Digit String) contains the check digit, which can then either be added to the base number or compared with the existing check digit.

The internal variables are:

- SU for the sum of the products,
 RE for the remainder,
 CD for the value of the check digit,
 I as the loop counter.

The subroutine itself at 1000 to 1090 is relatively compact, but is embedded here in a program which shows how it can be used to calculate or verify a check digit using a variety of weights by varying the input to the routine alone. The Basic used is a little unusual. The main incompatibilities with more standard dialects, apart from the punctuation of input statements, will be the optional test for non-numeric input in 1010, and the setting of an 80-column screen in the main program at 20. The screen width is not vital to the running of the program, but aesthetic considerations would suggest a rearrangement of some of the prompts if the screen were much narrower.

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PLANE THINKING

Frank Dutton explains how to remove hidden lines from three dimensional drawings.

When people talk of improving a 'wire frame' drawing they usually mean: 'How do I remove those lines which should not be there, because I "know" they are hidden?' The simple answer usually is you can't! The reason why lies in the data used to construct the drawing. The simplest model of an object consists of a set of point coordinates to represent the corners of the object, and a connection table to indicate which corners are joined together to represent the edges. When this simple model is manipulated to form a drawing, the result is an accurate picture (as far as the screen resolution will allow) of an object that is made up of points and lines. Nothing is hidden because there is nothing to hide behind. The drawing has no solidity because there is nothing solid in the model.

Look at any photograph and try to find some lines. The chances are there won't be any. What you will find are numerous boundaries between different colours, tones and textures. The different colours, tones and textures are the result of light being reflected, in different ways, from all the surfaces of the objects in the picture. The boundaries occur where one surface stops and another starts. If you pick up a solid object your hand presses against a solid boundary. On one side is the matter that makes up the object; you and the rest of the world are on the other. It is the opaque surfaces near us that hide others which are further away.

The use of lines to construct a drawing is an abstraction. The painter Paul Klee is reputed to have described some of his work with the comment: 'I took a line for a walk.' Lines are a shorthand way to describe the boundary of a surface; inside the boundary is the surface and on the other is something else. Outlines are used to describe the limits of an object. Outside the line is the rest of the world. By building a model of the object in terms of its faces and using this to generate a picture a more realistic solid image will be formed. The first stage along the road to realism is the removal of those hidden lines.

The model that will be constructed must provide the following information:
 — The position of each face; and
 — The limits of each face.

The colour and texture of each face could also be modelled but the use to which such information is put is outside the scope of this article. Any curved surfaces must also be removed and replaced by a number of facets or tiles which approximate the

curved surface. With the object reduced to flat surfaces a start can be made at generating the data for the model.

The easiest way to define the position of the face is by a face plane equation, which takes the following form:

$$ax + by + cz + d = 0$$

with a, b, c, d as constants and x, y, z as cartesian coordinates.

If the coordinates are made homogeneous then the equation can be written in the form: $[x \ y \ z] \begin{bmatrix} a \\ b \\ c \\ d \end{bmatrix} = 0$

where x, y, z forms a line vector and a, b, c, d forms a column vector.

A plane, which can be thought of as a very thin sheet, has two sides, and the plane equation can indicate the position of any point with respect to the plane. If the result of the point row vector with the plane equation column vector is less than 0 then the point is on one side of the plane and on the other if it is greater than 0. The ability to distinguish which side of the plane a point lies is extremely useful. When a plane is the

outside surface of a solid it has only one visible side, the one facing outwards. The other side faces into the solid matter of the object, and so must be hidden. The position of each face of the object is modelled by a column vector holding the constants of the plane equation for that face. These are assembled into a $4 \times n$ array where n = the number of faces.

$$\begin{bmatrix} a_1 & a_2 & * & * & * a_n \\ b_1 & b_2 & * & * & * b_n \\ c_1 & c_2 & * & * & * c_n \\ d_1 & d_2 & * & * & * d_n \end{bmatrix}$$

← faces →

The faces of the solid do not extend to infinity but are cut, where two faces meet, to form an edge of the solid and, where three or more faces meet, to form a corner or point. By limiting the description of each surface to a flat plane all the edges will be straight. This implies that each face can be described as a face polygon that has straight sides at edge boundaries and vertices at the corner points. The face polygons can be modelled by listing, for each face, the vertices that are encoun-

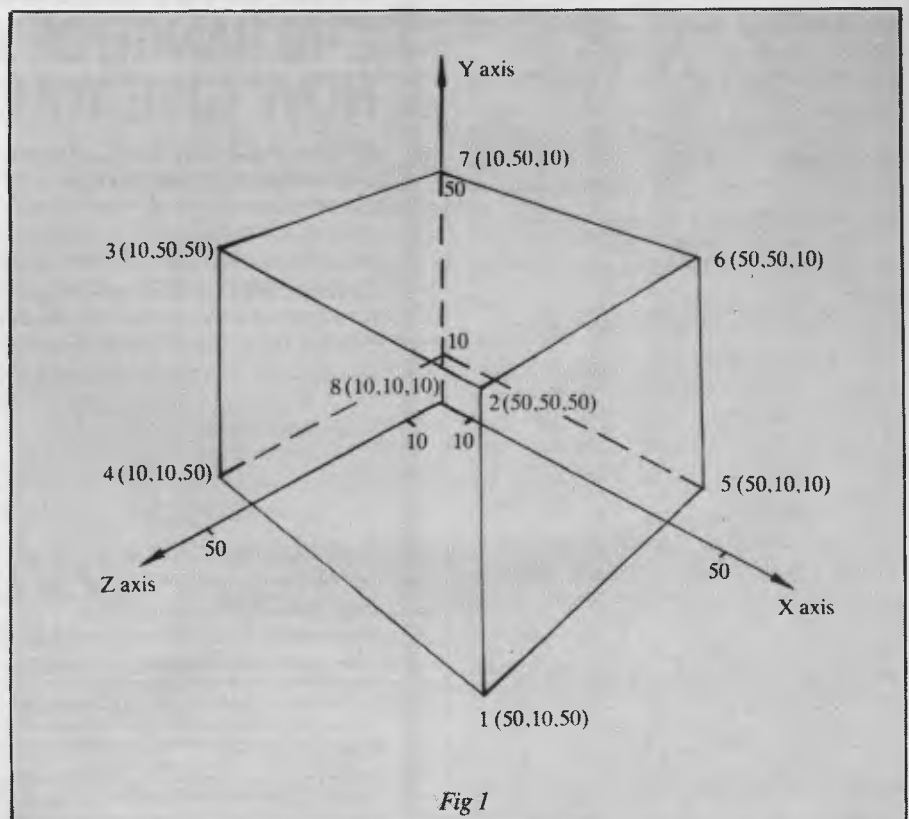
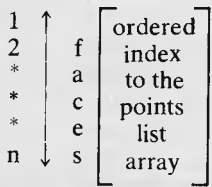


Fig 1

Array of face plane equation column vectors

tered as the polygon is traced out. The vertices are entered on the list in the order they are encountered. As the polygon is a closed figure the first and last entry into the list will be the same. As one corner will be shared by at least three planes it would be foolish to keep duplicate copies of the same information.

For this reason the corners are indexed. It is the corner point index that is entered into the face polygon vertices list; the index being used to point to the corners' position in a separate points list. The face polygons are therefore modelled by using two arrays: the face polygon vertices array, each row of which contains an ordered index of the corners of a polygon. To keep the data consistent each face is entered in the same order as was used for the face plane equations. The second array used in modelling the face polygons is the points list. Each row of this array is a homogenous coordinate vector, and the number of rows is equal to the number of corners of the solid.



max number of corners indexed for one polygon

Face polygon vertices array

x_1	y_1	z_1	1
*	*	*	1
*	*	*	1
*	*	*	1
*	*	*	1
*	*	*	1
*	*	*	1
x_n	y_n	z_n	1

Points list

The data structure of the model is now laid out and the arrays can be filled in. As an example a simple box, Fig 1, will be used.

The first step is to construct the face polygon vertices array and the points list. It has been shown that the face polygon vertices are listed in such a way that by joining the corners together, in the order they are listed, a closed polygon is traced out. The polygon may be traced out in two directions: either in a clockwise or anticlockwise direction. The convention is that all faces are traced out anticlockwise when

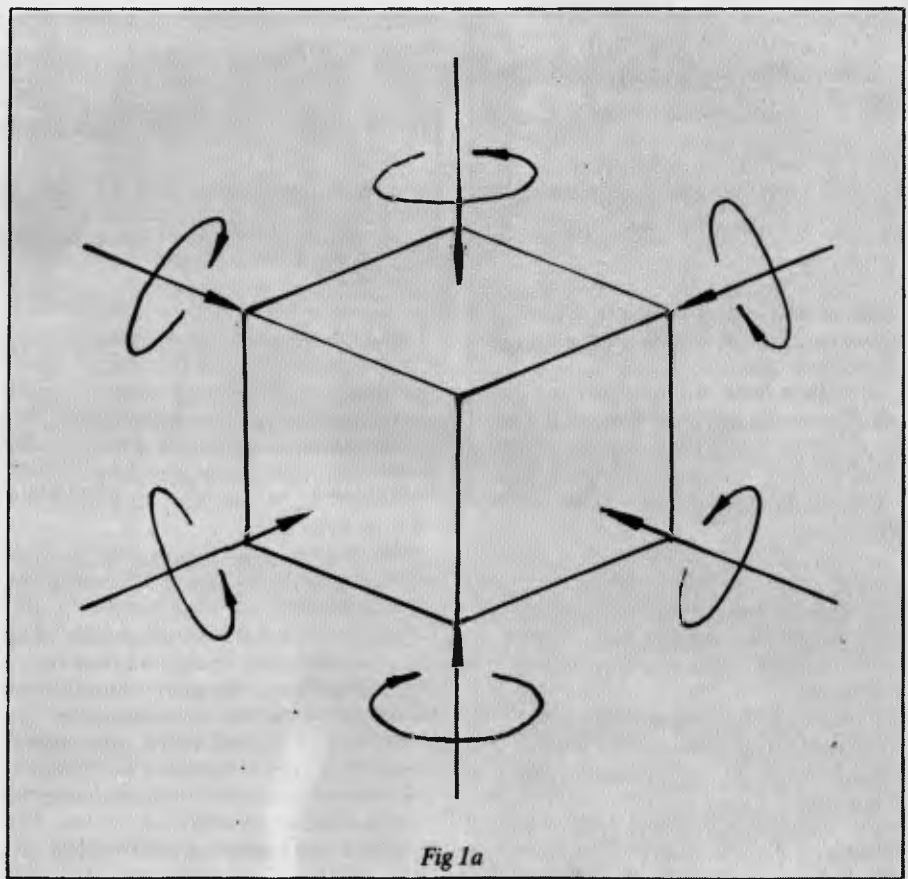


Fig 1a

viewed from outside the object.

When this step is complete the two arrays containing the information appear as in Figs 2 & 3 below.

1		1	5	6	2	1
2	f	1	2	3	4	1
3	a	2	6	7	3	2
4	c	1	4	8	5	1
5	e	5	8	7	6	5
6	s	4	3	7	8	4

Fig 2. Face polygon vertices array

		x	y	z	1
1		50	10	50	1
2	c	50	50	50	1
3	o	10	50	50	1
4	r	10	10	50	1
5	n	50	10	10	1
6	e	50	50	10	1
7	r	10	50	10	1
8	s	10	10	10	1

Fig 3. Points list array

The column vectors of the face plane equation can now be calculated. The minimum number of points required to describe a unique plane is three (as long as a continuous straight line cannot be drawn

through them). So three points must be found that are in the plane and not in a straight line. The first three corners indexed by the face polygon vertices list meet these requirements. The vertices of the polygon must be in the plane and as they are used to indicate a change of direction when tracing out the polygon, they cannot possibly be in a continuous straight line. The first three elements a, b, c of the face plane equation vector are calculated using the equations below.

$$a = \sum_{i=1}^{l-n} (y_i - y_j)(z_i + z_j)$$

$$b = \sum_{i=1}^{l-n} (x_i - z_j)(x_i + x_j)$$

$$c = \sum_{i=1}^{l-n} (x_i - x_j)(y_i + y_j)$$

for n points in the plane if $i < n$ then $j = i + 1$; if $i = n$ then $j = 1$, where i and j are the i^{th} and j^{th} corners indexed in the face polygon vertices list for the face whose plane equation is being calculated.

For face 1 the first three corners indexed are 1, 5, 6 so we substitute as in Fig 4.

$$\begin{aligned}
 a &= [(y_1 - y_5)(z_1 + z_5)] \\
 &+ [(y_5 - y_6)(z_5 + z_6)] \\
 &+ [(y_6 - y_1)(z_6 + z_1)] \\
 &= [(10 - 10)(50 + 10)] \\
 &+ [(10 - 50)(10 + 10)] \\
 &+ [(50 - 10)(10 + 50)] \\
 &= [\quad 0 \quad] \\
 &+ [\quad -800 \quad] \\
 &+ [\quad 2400 \quad] \\
 a &= 1600
 \end{aligned}$$

Fig 4

b + c are calculated in a similar manner (Fig 5).

$$\begin{aligned}
 b &= [(z_1 - z_5)(x_1 + x_5)] \\
 &+ [(z_5 - z_6)(x_5 + x_6)] \\
 &+ [(z_6 - z_1)(z_6 + z_1)] \\
 &= [(50 - 10)(50 + 50)] \\
 &+ [(10 - 10)(50 + 50)] \\
 &+ [(10 - 50)(50 + 50)] \\
 b &= 0 \\
 c &= [(x_1 - x_5)(y_1 + y_5)] \\
 &+ [(x_5 - x_6)(y_5 + y_6)] \\
 &+ [(x_6 - x_1)(y_6 + y_1)] \\
 c &= 0
 \end{aligned}$$

Fig 5

With the first three elements calculated, d is obtained by using coordinates of a point, that is in the plane, in the equation below:

$$d = -ax - by - cz$$

A suitable point is the first corner indexed in the face polygon list for the face equation being calculated.

That is, for face 1 the first indexed corner has the coordinates (50,10,50)

$$\begin{aligned}
 d &= -(1600 \times 50) - (0 \times 10) - (0 \times 50) \\
 d &= -80000
 \end{aligned}$$

When all the face plane equation column vectors have been calculated the array holding them will appear as in Fig 6.

Having constructed the data that will be used as the model for the object, we can consider how it is manipulated to form a drawing. It is desirable to be able to move the object in space so that it can be viewed in different orientations, with respect to the reference planes.

The transformation of a point, with homogenous coordinates, can be accom-

1600	0	0	0	0	-1600
0	0	1600	-1600	0	0
0	1600	0	0	-1600	0
-80000	-80000	-80000	80000	80000	80000
faces					
1	2	3	4	5	6

Fig 6

plished by the use of a 4x4 transformation matrix T.

$$\begin{bmatrix} x & y & z & 1 \\ * & * & * & | & * \\ * & * & * & | & * \\ * & * & * & | & * \\ * & * & * & | & * \end{bmatrix} = [x' \ y' \ z' \ 1]$$

transformation matrix

- the upper left 3 x 3 sub matrix being used to rotate the point about the axes;
- the upper 3 x 1 sub matrix being used for shearing and perspective projection;
- the lower 1 x 3 sub matrix being used to translate the point along the axes; and
- the lower right element being used for overall scaling.

When such a matrix is used to transform the points list of the model, the effect is to relocate the points relative to the axes of the reference planes. As the points are the vertices of the face polygons, it follows that the faces have also moved, and will now have different face plane equations. So having transformed the points list, the column vectors of the face plane equation have to be adjusted to keep in step. Recalculation of the vectors is possible but wasteful. What is required is a matrix similar to the matrix used to transform the points list homogenous coordinates. Fortunately, for most transformations, such a matrix exists. It is in fact the inverse of the transformation matrix.

The inverse of a matrix T is denoted by T⁻¹ and defined such that TT⁻¹ = I and T⁻¹T = I where I is the identity matrix.

For example,

$$\begin{bmatrix} * & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{bmatrix} \begin{bmatrix} * & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

T T⁻¹ I

For the purposes required here, a simple definition of the inverse matrix T⁻¹ is a matrix that does the exact opposite of T.

For example,

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos \theta & \sin \theta & 0 \\ 0 & -\sin \theta & \cos \theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

T

This is the transformation matrix for rotating the point coordinates an angle θ about the x axis.

The inverse of T must do the exact opposite.

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos -\theta & \sin -\theta & 0 \\ 0 & -\sin -\theta & \cos -\theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

T⁻¹

This is the transformation matrix for rotating the point coordinates an angle θ about the x axis.

It is the inverse of T because if the points are first rotated an angle θ about the x axis

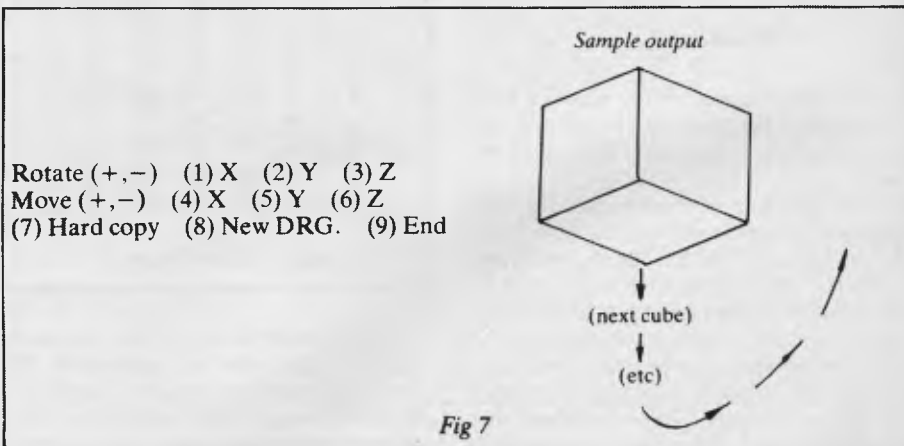


Fig 7



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- Graphics function with 640 x 200 dots
- Industry standard joy stick port

SPECIFICATIONS

HARDWARE

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ROM	8KB(IPL/CG)
Speaker	Alarm sound can be used
Keyboard	Detachable with coiled cable ASCII type low profile
Floppy Disk Drive	2 x 5¼" 160KB slim line drives dual 320KB (optional)
Display	8 x 8 dot cell with 80 char x 25 lines, 6 x 7 character font. B/W monitor or 8 colour RGB monitor option.
Communications	RS 232C port (optional)
Printer Interface	Std Joy stick facility Centronics Parallel

SOFTWARE

Operating System	MSDOS with CP/M-86 option
Language processor	Basic. Fortran-86. Cobol-86, Pascal MT + 86
Electrical	Local voltage + 10%
Dimensions	Main Unit 360(W) x 110(H) x 365(D)mm, Keyboard 449(W) x 35(H) x 169(D)mm



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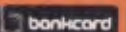
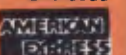
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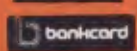
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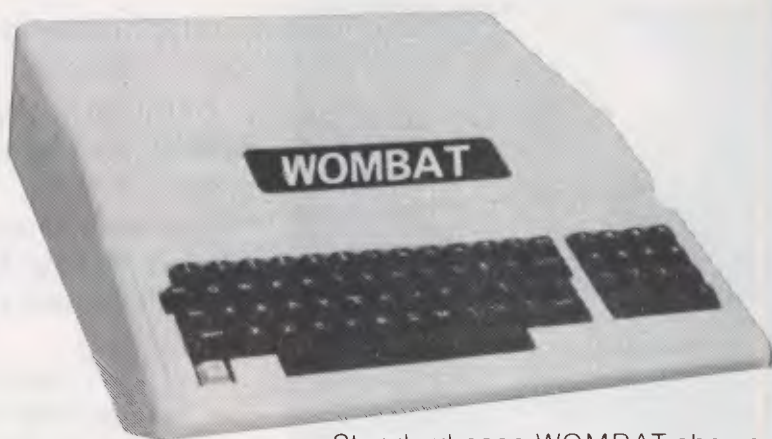
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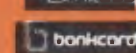
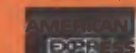
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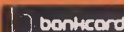
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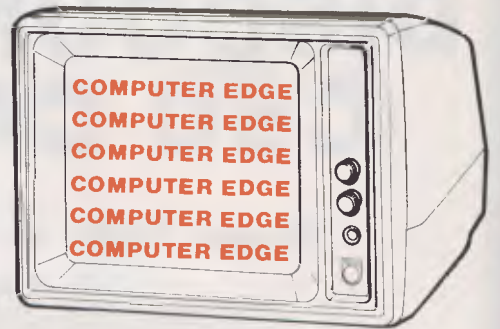


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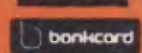
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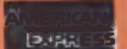
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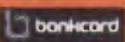
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PLANE THINKING

and then an angle $-\theta$ about the x axis, the points end up where they started from.

If \bar{T} exists then the column vectors of the face plane equation can be transformed using it.

$$\begin{bmatrix} \star & \star & \star & \star \\ \star & \star & \star & \star \\ \star & \star & \star & \star \\ \star & \star & \star & \star \end{bmatrix} \bar{T} = \begin{bmatrix} a \\ b \\ c \\ d \end{bmatrix} = \begin{bmatrix} a' \\ b' \\ c' \\ d' \end{bmatrix}$$

After all rotations and translations have been performed to adjust the orientation of the object, the final stage is to draw the object. It is usual to project the image of the object onto the plane $z = 0$ from a position (x_v, y_v, z_v, l) —the viewing position coordinates. To remove the majority of the hidden lines it must be determined which face polygons are visible from the viewing position and which are hidden. To sup-

press the projection of the face polygons that are hidden, a simple gate is used. By inserting the coordinates of the viewing position into the face plane equation of each face polygon, the result will determine visibility, that is.

$$[x_v, y_v, z_v, l] \begin{bmatrix} a \\ b \\ c \\ d \\ F_n \end{bmatrix} > 0 \quad \text{if the face } F_n \text{ is visible}$$

If a face passes this test, the face polygon can be projected by reading the appropriate row of the face polygon vertices list to find the corners.

The projected positions of the vertices of the polygon are determined by transforming them with a viewing matrix, which takes the form:-

$$[x \ y \ z \ l] \begin{bmatrix} 1 & 0 & 0 & -l/x_v \\ 0 & 1 & 0 & -l/y_v \\ 0 & 0 & 0 & -l/z_v \\ 0 & 0 & 0 & 1 \end{bmatrix} = [X_s \ Y_s \ 0 \ l]$$

X_s, Y_s being screen viewing coordinates transformation matrix

When the object is a convex polyhedron the task of removing all the hidden lines is complete. The screen coordinates can be plotted and the face polygons drawn.

With concave solids further steps may be required to ensure the complete removal of hidden lines but that is a topic for another time.

The routines for constructing the data and manipulating it are not complex and though 'real time' moving pictures of solid objects require machines much faster than those available for home use, the use of these techniques will greatly improve the realism of the pictures we can draw. For those that followed Paul Stevenson's article on Stereo Graphics (*APC* October 1982) you now have a way of specifying eye coordinates to generate a stereo pair without those confusing hidden lines.

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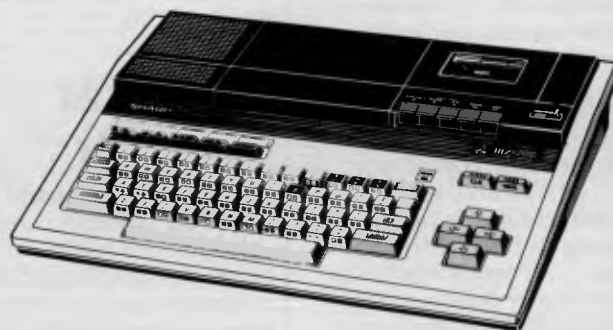
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Random rumours

Commodore is expected shortly to announce a new disk drive for the C-64 which uses the user port rather than the 488 serial bus interface thus speeding disk I/O, the slowness of which has long been a complaint of C-64 owners . . . Videobook Corp, Seattle, WA, is rumoured readying a \$600 personal computer that runs Apple, Commodore 64 and IBM-PC software . . . AT&T is said to be about to enter the personal computer market via its Information Systems division . . . MicroOffice Systems Technology, which introduced the 'RoadRunner' knee-top computer last fall (with an 8-line by 80 character LCD display and running CP/M) is promising to introduce units with 16 and 25-line displays by mid-year . . . At least six IBM-PC clones are expected from Taiwan during the first quarter of this year . . . Apple is expected to switch to the Sony microfloppy in its forthcoming MacIntosh micro computer, a less-pricey version of the Lisa . . . Microsoft is expected finally to release its new version of MS-DOS, which it has been working on for almost a year. The new version will have multi-tasking ability (*à la* Concurrent CP/M) and networking support . . . Adam Osborne is apparently about to start a new venture based on software publishing . . . Sources report that IBM has delayed introduction of its local area networking system because of problems with the

Up to the minute news from Sol Libes in stateside . . . six Taiwanese IBM PC clones expected . . . first optical storage disks launched . . . discounted video games . . . Wang to publish optical disk dictionary . . .

interface chips being furnished by Texas Instruments . . . There is speculation that Wang Labs may be readying a dictionary on optical disks since it has purchased exclusive electronic publishing rights to the *Random House Dictionary*, *Concise Oxford Dictionary of English*, *Roget's International Thesaurus*, *Black's Law Dictionary* and the *Chicago Manual of Style*.

Apple news

Dealers, despite Apple's attempts at preventing discounting of units, are offering discounts on the IIe. Most dealers attempt to conceal the discounts by bundling the unit with peripherals and software. However, there are dealers selling the basic unit unbundled for well under \$1000. And Apple is expected shortly to reduce the list price of the IIe to just under \$1000.

IBM introduces PC-Junior

IBM finally introduced the 'PC Junior' on 1 November after several months of rumours (under the name 'Peanut') that appeared in the press. The unit turned out pretty much according to rumour and in line with predictions that appeared in this column several months ago.

The unit, with a base price of \$670 (dealer cost about \$480) contains 64k of RAM, two slots for plug-in ROM cartridges and three expansion slots. The keyboard is cordless and communicates with the main unit via an infra red link. The unit includes three expansion slots which are dedicated to RAM expansion (64k), a floppy disk controller and modem card. A unit with a

slim-line floppy and 128k RAM will cost \$1270 (dealer cost about \$860). The unit will run MS-DOS version 2.1. Bus expansion is provided that can expand the unit by attaching modules. I/O is provided for joysticks and cassette storage. The unit drives a colour monitor with better resolution and more colours than the PC.

Industry pundits speculate that IBM will corner 20% of the under \$1000 home computer market this year with its PC Junior system. And, they expect this to rise to over 30% next year. They predict that IBM will take first place away from Commodore, with Coleco in second, pushing Commodore down to number three.

Dealers received initial limited shipments of the PC Junior in November but it will be January before any significant quantity becomes available. Predictions are that IBM will produce one million of them this year and probably over three million next year.

The question now is what will be the impact of this unit on the sales of the PC?

Bad times

Atari, which had expected to ship at least half a million of its new XL series of computers by the end of last year is rumoured actually to have shipped only a little over 100,000 units. Shipments, which were supposed to begin in September did not begin until mid October.

Atari is rumoured readying a new high-end computer that is IBM-PC compatible. If true it may signal a move by Atari away from the low-end home computer business in which it has, as yet, to show a profit.

Warner Communications, Atari's parent, reported a loss for the first nine months of '83 of almost \$425 million. While the company's profits from other businesses rose by 32%, the Atari video game and

computer divisions produced a loss of over \$536 million on sales that dropped from \$1.41 billion to \$753.6 million.

And Coleco Industries, which promised to start shipping its Adam system by the end of last August did not actually begin shipments until the end of October. Thus it is expected to ship far less than the half million units promised by the end of '83.

Predictions are that the first quarter of 1984 will see a lot of distress sales of inventory by companies leaving the business.

Also, the video game boom of the last few years appears to have run its course as game module sales dropped last year to less than six million from eight million the year before. Further, it is estimated that 15% of the 10,000 game parlours closed their doors last year as revenues and profits dropped. K-mart, which at one time had video game rooms in 200 of its stores has phased them out in favour of selling home computers and other electronic products. Arcade operators are hoping that the new video disk-based games now becoming available will improve their situation.

Home video game units are now being sold at bargain-basement prices and some are used as loss-leaders being sold below cost. Also the sales of cartridges has become a commodity business where price is everything.

IBM demos LAN

IBM demoed a prototype Local Area Networking system at the Telecom '83 show held in Geneva in October. This indicates that IBM is very close to introducing its long-awaited LAN system. The system used a token-passing ring architecture to communicate among word processors, file and printer

YANKEE DOODLES

servers and PC workstations.

The top 10 micro makers

Future Computing Inc, a marketing research firm in Richardson TX, has released its chart of the top ten personal computer manufacturers in the US and their anticipated personal computer sales (in millions) for 1983 (including hardware and software). It is as follows:

IBM	\$1400
Apple Computer	1100
Radio Shack	1100
Commodore	800
Hewlett-Packard	550
Texas Instruments	450
Atari	350
Digital Equipment Corp.	200
Victor	150
Televideo	100

1983 represents the first time that any company has done more than \$1 billion in personal computer sales . . . and last year three companies passed the mark. Total retail sales for personal computer hardware and software for 1983 is expected to exceed \$10 billion. It is also interesting to note that three of the top ten are newcomers to the microcomputer field having introduced their first machines last year. They are DEC, Victor and Televideo. This year is expected to see even greater success by these companies as it has been estimated that fewer than 7% of US office workers currently have personal computers, and less than 10% of US homes have a home computer.

Intel delays 186 & 286

Intel Corp is reportedly having trouble delivering the 80186 and 80286 top-of-the-line microprocessors and this is expected to delay the introduction of the more powerful versions of the PC/XT

expected from IBM. Intel has acknowledged that early shipments of these units contained a microcode bug that rendered the units using these chips incompatible with the PC/XT which uses the 8088 chip.

Intel reports that it has encountered a much higher demand for these parts than it had anticipated. This is expected to cause shortages in the market-place for some time to come. Advanced Micro Devices, expected to second source the chips, is still some time away from production.

Intel is reportedly also encountering problems in making 286 chips that run above 4MHz. Thus the supply of 6MHz units are in very short supply and the 8MHz are scarce. Intel is attempting to ramp up to producing 100,000 286s a month.

First optical storage devices come to market

Shugart has released its Optimum 1000 1-Gbyte optical disk drive priced at \$6000. The device uses a laser to write indelible information on a pre-formatted 12-inch removable cartridge optical disk. This is now the second such unit to become available, the first being from Panasonic. Panasonic is also shipping a 7in video disk which some customers are using for data storage. An erasable version is expected next year.

Units are also expected shortly from the following companies. Storage Technology is expected to introduce a 4-Gbyte unit using 14in medium and a technology similar to that used by Shugart. The unit will be designed for use with IBM mainframes.

NEC and 3M Co. are cooperatively developing a unit using 12in disks and a technique

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(The information in this table is believed to be correct, based upon vendor documentation but cannot be guaranteed).

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using a laser to burst preformed blisters. NEC is expected to start shipping units shortly. Phillips, Sharp and Sony are also known to be working on systems even though no formal announcements have been made. Hitachi, Toshiba and Sanyo are all currently beta testing small low-cost units and announcements are expected shortly.

IBM reports record profit increase

IBM reported that third quarter '83 net income rose 25% to \$1.3 billion. According to John Opel, IBM chairman, IBM sold 850,000 PC/XT units in '83 and expects to sell about two million this year. Personal computer sales accounted for 2-4% of IBM's sales and this year are expected to rise to 6%.

Incidentally, IBM's income from interest on bank deposits and securities tripled to \$232 from \$80 a year earlier. In other words IBM has a lot of cash sitting in the bank and is therefore looking to spend it increasing its outside holdings in suppliers (for example, Intel).

More bad news

After a year of sustaining losses of more than \$500 million in its home computer operation, Texas Instruments has decided to stop production of its TI-99/4 home computer and pull out of the business completely.

Digital Equipment Corporation, for the first time, announced a decrease in earnings and disclosed that it is having trouble selling its personal computers in the 'office systems' market. DEC disclosed that it had sold about 19,000 micros in the last quarter, about 30% less than it had expected to sell.

Apple Computer disclosed that earnings for the last quarter dropped by 73% despite an increase in sales of 55%. This sales increase, however, reflected a considerable decrease in Apple's growth rate. In the meantime its expenses for research and development and marketing and distribution soared.

Osborne Computer, which filed for protection under chapter 11 in October, still has not found a buyer or been able to get into production on its IBM PC-compatible version of the Executive. Further, Osborne dealers with stocks of Osborne Executive machines have been offering them for sale at well below their cost. I recently saw an ad offering the Executive for \$1475, which is about half its list price.

AI, where are you?

AI (Artificial Intelligence), long the province of academia, is beginning to move out of the research facilities and into the practical world. However, it is still more promise than product. It is currently very expensive and limited to very select and sophisticated markets. However, it is expected that by 1987, and possibly earlier, we can expect to see AI products running on personal computers.

An estimated 50 institutions are currently engaged in AI research and development. This includes companies such as IBM, Xerox, General Electric and Texas Instruments. They refer to their work as 'knowledge engineering'.

The primary areas being worked on in AI include expert systems, intelligent robots, natural language processing and Lisp machines. Lisp is the most widely used language by AI engineers and limited implementations of the language are already running

on many microcomputers. Expert systems are knowledge-based and are capable of making conclusions and recommendations based on partial information. Expert systems have already been developed to do medical diagnosis, find mineral deposits and design computer systems.

Random news bits

Xerox, which only two months ago boasted that it planned to open 50 computer stores a year for the next few years, has sold off 43 of its current stores and shut the remaining 10 stores. Rumours are that it always operated in the red... Visi On, the much-touted Lisa-like, front-end program manager for the IBM-PC, which was first demoed in November 1982,

should finally be in the stores by the time you read this column, only about six months behind the promised delivery time... Intel has introduced a non-volatile byte-wide 4k RAM. Its secret is an EPROM shadow memory that retains the data when power is turned off... Docutel/Olivetti has introduced a knee-top computer. What is interesting about the unit is that it is the third such unit (the other two are from Tandy and NEC) designed and made by Kyocera in Korea...

Quotation of the month

'The shake-out of 1985 is happening now'. Steve Jobs, Chairman of the Board, Apple Computer Corp.

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COLUMN SORT

Most dedicated wordprocessors include a column sort facility; many software packages do also. Here's an algorithm from Len Wood and Jack Brown from which you'll be able to implement such a routine in the dialect of your own micro. Use it on its own, or as a sub-routine in a wordprocessing program.

This article is about a user-friendly way of printing a list of names in two or more columns. Suppose we have a list of names in alphabetical order which we wish to print in three columns. The result might be:—

ALAN	ALFRED	ALICE
ANNE	BERT	BETTY
BILL . . .	and so on.	

That format is easy to program. Print the first three names, then the next three and continue until they have all been printed. However, I suggest that that's not the most user-friendly format.

Take a look at the Advertisers' Index at the back of *APC*. There the names are listed vertically instead of horizontally. The vertical format is also used in the indexes of books, in telephone directories and in dictionaries. Long vertical lists are easier to scan visually because less eye movement is needed.

Imagine that we want to print such a vertical format list. We have to print the name at the top of each column, then the second name in each column, and so on. Let us impose a constraint that the column lengths must be nearly equal. More precisely, the longest column must contain at most one more name than the shortest column.

The core of the problem of printing the list in vertical format is to work out which names are to be printed at the tops of the columns.

To simplify the discussion let us leave names for the moment and work out how to print the sequence of numbers 1 to 14 in four columns. We'll get back to names later. The 14 numbers would be printed like this:—

1	5	9	12
2	6	10	13
3	7	11	14
4	8		

More generally, let the total number of numbers in the sequence be t . Let the required number of columns be c . Using integer arithmetic, divide t by c getting quotient q and remainder r . Let the numbers to be printed in the first print line be $P_1, P_2, P_3, \dots, P_c$. Using the convention that the value of $(a > b)$ is 1 if $a > b$ and is 0 otherwise, we have:—

$$P_1 = 1$$

$$P_x = P_{x-1} + q + (r > (x-2))$$

where x takes the values 2, 3, 4, . . . c

Using the example of a sequence of 14

numbers printed in four columns, we get $t = 14$, $c = 4$, $q = 3$, $r = 2$. Then we calculate:—

$$P_1 = 1$$

$$P_2 = 1 + 3 + (2 > 0) = 5$$

$$P_3 = 5 + 3 + (2 > 1) = 9$$

$$P_4 = 9 + 3 + (2 > 2) = 12$$

That gives us the first printed line:—

1	5	9	12
---	---	---	----

Those four numbers are each increased by 1 for the second line, and so on. If a number to be printed exceeds 14 we replace it by a space and of course we stop when all 14 numbers have been printed.

Now consider the task of producing a printed list of names in alphabetical order. If the names are already in alphabetical order then we can proceed as before and use the calculated $P_1, P_2, P_3, \dots, P_c$ as pointers into the alphabetically ordered list of names.

If there were 14 names to be printed in four columns then, from the previous results, the names at the tops of the four printed columns would be the 1st, 5th, 9th and 12th names from the original list. So names already in alphabetical order present no problem.

If the names are not in alphabetical order then one way of proceeding of course would be to sort them.

In some cases this might not be desirable. For example, it might be necessary to keep the names in the order in which they were entered into the list. Space limitations might prohibit keeping two lists; one being maintained in alphabetical order for the purpose of printing. Also, in the case of a long list there might be an objectionably long time interval between starting to sort and starting to print.

If we wanted to print the list of names alphabetically in a single column then it might be possible to hide the sorting time within the printing time. Find the alphabetically earliest name not already printed. Print it. Repeat until all the names in the list have been printed.

However, printing the list of names in several columns presents a problem. How do we find, say, the 125th name in the alphabetical order without first finding all those that precede it?

The suggestion here is to divide the sorting time into thin slices, but instead of hiding these slices within the printing time hide them in the list creating and updating time. Whenever a name is added to the list

that name's alphabetical order is calculated and recorded. Whenever a name is removed from the list the alphabetical order numbers for the remaining names have to be adjusted.

In more detail, as well as the list of names, we need to keep two lists of numbers; one pair of numbers for each name. The assumption here is that the lists of numbers would require less space than a duplicate list of names for sorting into alphabetical order.

For the moment let us concentrate on just one of the list of numbers. We'll find a use for the other one later. Associate the first name in the name list with the first number in the number list, whatever its value. Associate the second name with the second number whatever its value, and so on. The values of the numbers will be changed but the 'Nth' name will always be associated with the 'Nth' number, whatever its value.

Whenever a new name is added to the name list the new name's associated number is set to a value of 1. The name list is then scanned.

For each existing name which is alphabetically earlier than the new name, the new name's associated number is increased by 1. For each existing name which is alphabetically later than the new name, the existing name's associated number is increased by 1. Whenever a name is removed from the name list, the name list is again scanned. For each existing name which is alphabetically later than the removed name, the existing name's associated number is decreased by 1. Also, the gaps left by the removed name and its associated number should be closed by moving up one position all names and numbers below the gaps in the respective lists.

In the following example the names have been placed in the name list in the order shown. Each new name was placed at the bottom of the existing list. The number list shows how the numbers have been changed each time a new name was added.

ALFRED	1	2
BILL	2	3 4
FRED	3	4 5
ANNE	2	3
ALAN	1	

When ALFRED is entered, his associated number is set to 1 and remains at a value of 1 until another name is entered.

COLUMN SORT

When BILL is entered his number is set to 1. The existing list is scanned and BILL is found to be alphabetically later than the only name in the existing list, ALFRED, so BILL's number is increased by 1 to 2. ALFRED's number is left at 1. When FRED is entered his number is set to 1 and then during the scan FRED's number is increased once for ALFRED and once for BILL. Thus FRED's number becomes 3. ALFRED's stays at 1 and BILL's at 2. When ANNE is entered, her number is set to 1. During the scan ANNE's number is increased by 1 for the only earlier name, ALFRED. So ANNE's number becomes 2. Both BILL and FRED are found to be later than ANNE so their numbers are increased by 1 becoming respectively 3 and 4. At this point the respective numbers for the four names in the list are 1, 3, 4, 2. When ALAN is entered his number is set to 1. During the scan all four names in the existing list are found to be alphabetically later than ALAN so their numbers are increased by 1. No name is found to be earlier than ALAN so his number stays at 1. At this point the respective numbers for the five names are 2, 4, 5, 3, 1.

The following example shows what happens to the numbers when a name is removed.

ALFRED	2
BILL	4, 3
FRED	5, 4
ANNE	3
ALAN	1

Suppose ANNE is to be removed. The list is scanned and two names, BILL and FRED, are found to be alphabetically later than ANNE so their numbers are reduced by 1 to become respectively 3 and 4. After closing the gaps left by the removed name and associated number the lists become:—

ALFRED	2
BILL	3
FRED	4
ALAN	1

So the sorting process has been sliced up so that just one scan of the existing name list is done whenever a name is entered or removed.

Now we can return to the task of printing a list of names in two or more columns in alphabetical order where the list is not already in alphabetical order.

We do have though a list of numbers which indicate the alphabetical order of the names.

Let us use our last example of four names, ALFRED, BILL, FRED, and ALAN, with their respective numbers, 2, 3, 4, 1. When we wish to print the name list we have to create the second number list referred to earlier. Let us call this second

number list our inverse number list.

Our four names with their number list and inverse number list would be:—

ALFRED	2	4
BILL	3	1
FRED	4	2
ALAN	1	3

We produce our inverse number list by saying that if the 'Nth' number in our first number list is M then set the 'Mth' number in our inverse number list to a value of N. Now if we want, say, the alphabetically 3rd name we look at the 3rd number in the inverse list and use its value as a pointer into our name list.

We are now ready to print. Let us return to our earlier example of 14 names. Suppose our inverse number list for the 14 names is 2, 14, 9, 1, 4, 5, 13, 3, 8, 12, 7, 10, 6, 11. Our first printed line must be the alphabetically 1st, 5th, 9th and 12th names from our earlier calculations. The 1st, 5th, 9th and 12th numbers in our inverse number list are 2, 4, 8, 10. So we print the 2nd, 4th, 8th and 10th names from our name list as the first printed line. For our second printed line we use the same

procedure to print the alphabetically 2nd, 6th, 10th and 13th names. We continue thus for the third and following print lines except that when the calculations would lead to a name whose alphabetical order would be later than the 14th we just print a space. When all 14 names have been printed we stop.

In summary, given the total number of names and the required number of columns, calculate the values of $P_1, P_2, P_3,$ and so on. If the names are in alphabetical order then use those P values as indexes into the name list to get the names at the tops of the columns. If the names are not to be placed in alphabetical order then arrange that as the name list is created the first number list is also created. When printing is required, create the inverse number list. Use the P numbers to index into the inverse number list and use the numbers found there to index into the name list to get the names at the tops of the columns.

If you experiment with pencil and paper and a small number of names you will see that the method works. The method might be useful when you want to produce a printed list that's user-friendly.

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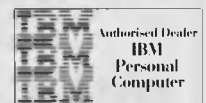
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CHECKOUT

The Eve of Adam

Will the Adam initiate a price revolution? Brian Power investigates Coleco's industry-shaker.



A lot of computer makers talk about giving you more for your money. Every month there is yet another system hustled onto the market with promises of a larger memory and more power — all for a smaller investment.

Coleco is basing its much-publicised new Adam on that premise. This computer is offered at such a radically lower price that the industry is watching to see if Adam can live up to its advance billing.

What makes this computer so different is that the entire system, including a letter-quality printer, will sell for just \$700 in the US. (No prices are available for Australia yet.) You would expect that kind of price breakthrough from one of the larger American companies such as Apple or IBM. But Coleco? Isn't it best known for its toys and games?

The company isn't talking much about how it managed such a coup. But the vertically-integrated company was able

to develop its own printer and tape drive and other new technology such as simpler motors. You end up with 80k of internal memory, a full keyboard, a good mass-storage tape system, built-in word processing and a letter-quality printer in the basic system. Here's how the Adam is put together.

Presentation

Coleco obviously knew that Adam will go into the homes of a lot of first-time computer buyers, and the machine had to inspire confidence just sitting in the box. It does. Blessed by the fact that the computer connects to the television set, Coleco can package the Adam without a monitor and make for a more compact unit.

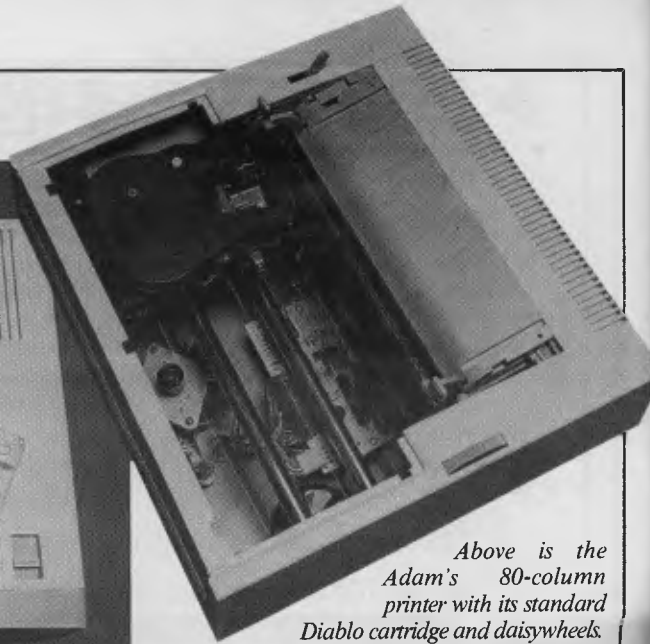
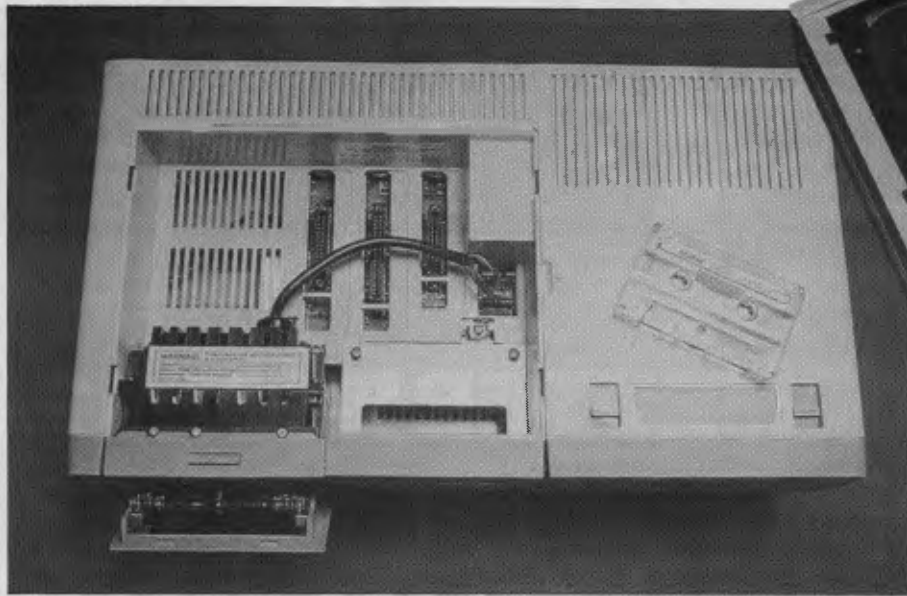
The whole thing comes in one 18kg box that one average adult could wrestle in and out of taxis and even through train stations, if it had to come to that. The

Adam is smartly, and safely, packaged inside a bright box. I have seen them cause a real stir among air travellers as they spun round the baggage sections at a major airport.

Documentation

The Adam comes with three books, a 64-page set-up manual and two larger binders for word processing and programming in Basic. You can see the way Coleco rushed the Adam onto the market by the fact that pages in the word processing book have newly-written instructions glued over the old ones.

It is obvious that Coleco expects some Adam buyers will never get beyond the set-up manual. That manual contains enough information for simple word processing so that you don't really need the more extensive binder. It also tells readers that programming is a hobby like sewing or carpentry, and they don't have



Above is the Adam's 80-column printer with its standard Diablo cartridge and daisywheels. At left is the main Adam processing box with cartridge software slot (bottom right), floppy cassette tape drive (bottom left) and plug-ins for further expansion.

to bother learning it if they don't want to. This set-up manual is a welcome change from many instruction books — it is actually easy to follow. A no-nonsense book that doesn't pander to the novice, it contains simple instructions and plenty of clear photos that take you from unpacking the box to changing the printer ribbon. The on-screen help menus are extensive enough to get you going without the manual once Adam is taken out of the box and plugged in.

Construction

We now move in to the heart of the matter. Coleco has created Adam from three main components, the memory console, the keyboard and the printer. The console includes the system's Z80A microprocessor, meaning compatibility with the CP/M operating system, the RAM and a high-speed tape drive.

The microprocessor addresses 64k of RAM but the computer also contains a separate processor for the video display that includes an additional 16k of memory just for graphics, bringing the total to 80k. Another 64k of RAM is available as an option, bringing the total up to 144k.

The sculptured keyboard has 75 keys, including six programmable function 'smart keys' that correspond with six labelled boxes on the screen. The keyboard has the feel of more expensive systems and I give it a good rating.

Coleco was thinking of word processing when it designed the keyboard, including keys such as *insert*, *delete*, *move/copy* and *store/get* to provide quick access to specific word processing

functions. In addition to ten command keys, there are cursor arrow keys.

Two game controllers come with it. While they are primarily for playing games, one of them can be attached to the keyboard to move the cursor, as an alternative to the arrow keys, and can also be used for entering numbers.

The keyboard and printer have separate microprocessors, and a communications system Coleco calls Adamnet ties the whole thing together. It is enough to allow the computer to do simple multi-tasking.

Screen

The screen for the Adam is likely to be your own television set. It had better be colour or you will miss a lot of what Adam offers. During some operations the screen contains four different sections, with four different colours.

The screen is set up to convince you that working on Adam is no different than typing on a typewriter. I wish computer makers wouldn't bother because the screen is going to start looking tedious once you get used to the system.

There are graduated markers up the left side and across the top of the screen, to set the margins for a printout. There is a band of six blue boxes across the bottom of the screen that correspond to 'smart keys'. Above that is a roller, shaped like a typewriter roller, which you write into. After writing two lines, the lines begin rolling up the screen.

If it sounds cluttered, it is. There isn't much room on the screen for your work by this point. Coleco is assuming you are

incapable of thinking for yourself and need to be shown everything.

Storage

A lot of people prefer the faster and more reliable disk drives to tape cassette storage. But Coleco has got around that, and lowered the cost of Adam, by developing a high speed tape system with a transfer rate to the microprocessor of 19.2k bits per second — eight to 16 times faster than other cassette systems. While it was still slower than a floppy disk, I found it worked quickly and transferred the information without any problems.

The closed-loop bidirectional tape is preformatted to hold 500k of information (about 250 pages of text). Information is stored sequentially on the tape, with the initial information stored in the middle of the tape and later files added on either side.

Printer

So far I have been fairly positive in detailing Adam, but when it comes to the printer I begin to worry. By advertising Adam as a complete system, it could live or die if the printer doesn't hold up.

To be positive, a lot of letter-quality printers alone cost as much as Adam. Coleco has developed an 80-column bidirectional printer with a 9½ inch carriage that uses standard Diablo daisy wheels, allowing you to choose your type face, as well as standard ribbon cartridges.

For the price, I suppose I could live with the 120 words per minute speed, although it seems painfully slow.

But here's the rub. Most of the printer is made of a hardened plastic and doesn't look all that sturdy. I have doubts that it could run well for any length of time. It looks like a small child could do a lot of damage quickly. Coleco swears it has tested the printer extensively, but I couldn't help wondering how well the printer could stand up to six months or a year of printing.

Expansion

The entire Adam can be an expansion module, so to speak. You can buy a stepped-down version of the Adam which allows you to fit your Coleco Vision video game system into the memory console.

Coleco plans to introduce an expansion module early this year, which will contain a floppy disk drive and an 80-column card for those who are going to do more serious work. It will sell for \$300 in the US.

Adam has four expansion slots, three for peripheral cards and one for the upcoming expansion module. The slots can be used for such options as the 80-column card, Coleco's steering wheel for its turbo game or an adaptor for Atari 2600 game cartridges.

At this point, none of these are available, last winter they expected the expansion module to be ready by the end of last year, but that has obviously proved too optimistic.

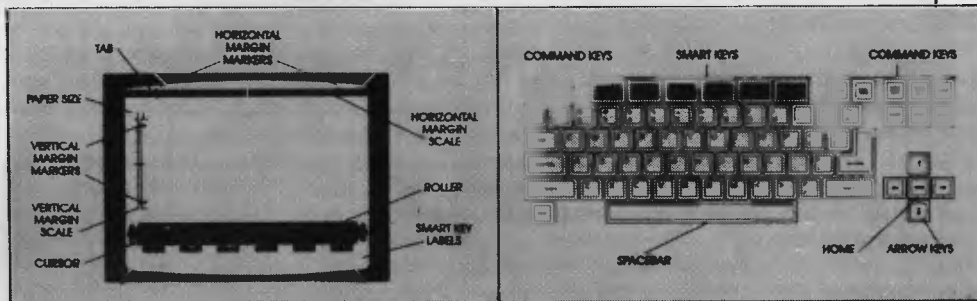
Software

In most systems the word processing package comes on a separate cartridge or disk, but on Adam the Smartwriter word processing program is built right into its ROM. Turn on the computer and it is automatically in a typewriter mode, where every letter you strike on the keyboard is typed onto the printer.

A keystroke switches to the word processing program, which offers on-screen correction, deletion and text-searching. It highlights the text to be moved or deleted. It has an *undo* key to retrieve material if you change your mind or have made a mistake.

Adam has only 36 columns, which is hardly adequate if you are going to write often. Adam has several ways around this. There is a scrolling function that lets you move a window back and forth. A modelling function simulates the 80-column format by showing only the characters near the margins. In a word, they seem clumsy and an inadequate replacement for a wider character display.

The computer comes with two data pack tapes, the Smartbasic language and the Buck Rogers — The Planet of Zoom game, a product much more sophis-



The Adam's keyboard and screen layout are shown in the diagrams from the Adam Smartwriter Easy Reference Guide. The Adam's built-in Smartwriter word-processor can operate in two modes — as a straight electronic typewriter using the daisywheel printer and as a full scroll-across 80-column word-processor.

The diagram at left shows what the screen looks like when you're word-processing, while the keyboard layout sketch shows the position of the Adam's function keys above the main board. The function keys handle things such as search and replace/margins/tabs, line spacings and storage.

icated than the game currently available on ROM cartridges.

Smartbasic's source code is compatible with most Applesoft Basic statements. While most programs written in Applesoft Basic will run on Adam, there are differences in the use of PEEK, POKE and CALL commands.

Coleco is currently working with software companies to convert some CP/M programs to the Adam tape system. It remains to be seen just how many software developers will convert their systems, although a disk drive module would probably increase the number.

Coleco isn't waiting. It is developing a Smartfiler database management program, to be released early this year, to manage spreadsheet analysis, telephone directories and personal planning diaries.

Verdict

Coleco has set a rock-bottom price for the Adam system, but this puts the whole system out on a limb if one section such as the printer doesn't work.

I think Coleco is going to have to prove that its printer is really sturdier than it

looks. I would like to see it used for six months before I am convinced it can stay the distance.

Also, why put all this emphasis on word processing and then make a system with 36 character lines. It doesn't make sense. The moving window that lets you scroll across the width of the line doesn't impress me as any kind of practical alternative. I think a lot of people who plan to write more than two letters a week to Aunt Maud are going to want the 80-character upgrade — and will have to pay more for it.

Yet in the end, providing the printer holds up and you can use 80-character lines, I think the Adam is a welcome addition. At the very least, if it sells heavily it is going to force the price of other computers down.

Prices

Main unit including cassette drive, printer and computer unit . . . \$700US
 Anticipated price for floppy disk and 80-column card \$300US
 Anticipated price for Adam conversion unit for Coleco games machine \$500US

Specifications

Price	\$700US
Processor	Z80
RAM	80k
ROM	32k
Text screen	30 x 24
Graphics	Screen same as Coleco's high-resolution games machine
Storage	Cassette tape digital data pack — 500k formatted storage per tape — (included with machine) and optional disk drives available in future.
Interfaces	Daisywheel printer included with machine using non-standard (for disk drives, 80-column cards and others)
OS/Language	Coleco's SmartBasic
Distributor	CBS Records (02) 339 0255

THE GRAPHIC ARTS

PRINT@ gives Harold Gibson high expectations of low resolution graphics.

High resolution can make a machine seem a really attractive buy, and many of the newer machines on the market really shine in this area. But you can still perform some fairly spectacular feats with low resolution graphics if your micro, like the Tandy Colour Computer, has a PRINT@ facility.

The lowest resolution of the Tandy's 14 modes is the Alphanumeric Mode, which is the mode entered when the beast is first fired up. The screen is divided into 32 parts horizontally, numbered 0 to 31 in single steps, and 16 parts vertically, numbered 0 to 480 in steps of 32. You can get the general idea from figures 2 and 3.

Each rectangle or screen print location so formed corresponds to one text or graphics character position, so by reading across and down and adding the two numbers together, you can read off a unique identifying number for each position. The bottom right hand corner position, for example, would be 480+31=511.

Each of these screen print locations is

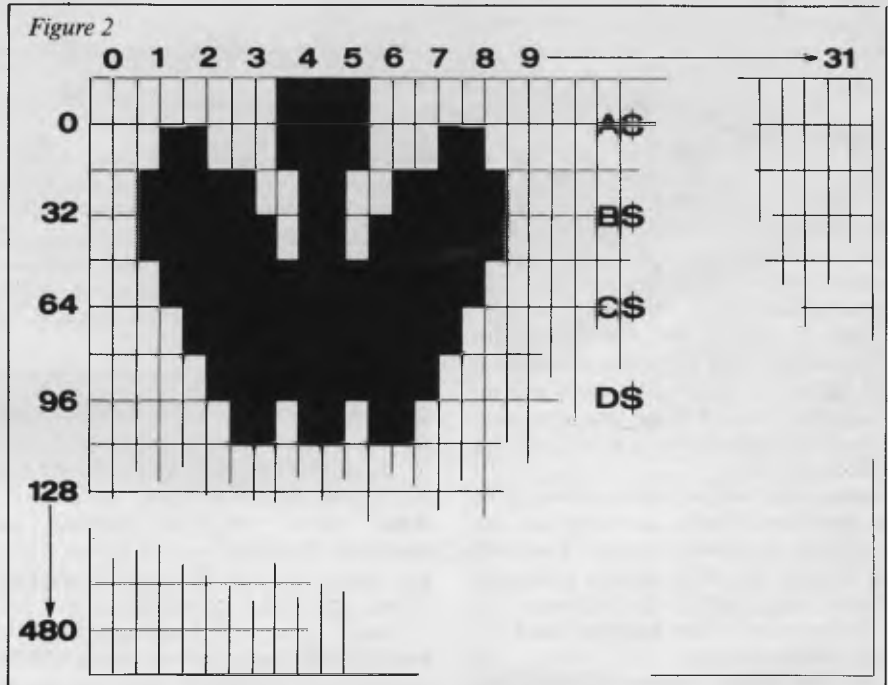


Figure 1

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70 CLS(5)
80 GOSUB1000
90 CLS(0)
100 **EAGLE STRINGS**
105 A1$=CHR$(143+48)+CHR$(143+48)
110 A$=CHR$(129+48)+CHR$(130+48)+CHR$(128)+CHR$(143+48)+CHR$(143+48)+CHR$(128)+C
HR$(129+48)+CHR$(130+48)
120 B$=A1$+CHR$(139+48)+CHR$(139+48)+CHR$(138+48)+CHR$(135+48)+A1$
130 C$=CHR$(132+48)+A1$+A1$+A1$+CHR$(136+48)
140 D$=CHR$(128)+CHR$(132+48)+CHR$(143+48)+CHR$(141+48)+CHR$(142+48)+CHR$(143+48
)+CHR$(136+48)+CHR$(128)
150 F1$=CHR$(128)+CHR$(128)+CHR$(128)+CHR$(128)
155 F$=F1$+CHR$(131+48)+CHR$(131+48)+F1$
160 G$=CHR$(135+48)+CHR$(139+48)+CHR$(139+48)+CHR$(141+48)+CHR$(142+48)+CHR$(129
+48)+CHR$(135+48)+CHR$(139+48)
170 R$=CHR$(141+48)+A1$+CHR$(135+48)+CHR$(139+48)+A1$+CHR$(142+48)
180 S$=CHR$(128)+CHR$(141+48)+A1$+A1$+CHR$(142+48)+CHR$(128)
190 T$=CHR$(128)+CHR$(128)+CHR$(140+48)+CHR$(132+48)+CHR$(135+48)+CHR$(140+48)+C
HR$(128)+CHR$(128)
200 **CASTLE STRINGS**
210 G1$=CHR$(143+32)+CHR$(143+32)
220 G$=CHR$(131+32)+CHR$(129+32)+CHR$(130+32)+CHR$(129+32)+CHR$(130+32)+CHR$(129
+32)+CHR$(130+32)+CHR$(131+32)
230 H$=CHR$(141+32)+CHR$(143+32)+CHR$(141+32)+CHR$(142+32)+CHR$(141+32)+CHR$(142
+32)+CHR$(143+32)+CHR$(142+32)
240 I$=CHR$(128)+CHR$(143+32)+CHR$(135+32)+CHR$(139+32)+CHR$(135+32)+CHR$(139+32
)+CHR$(143+32)+CHR$(128)
250 J$=CHR$(128)+G1$+G1$+G1$
260 K1$=CHR$(140+32)+CHR$(140+32)
260 K$=CHR$(128)+K1$+K1$+K1$
270 L$=CHR$(143+32)+CHR$(135+32)+CHR$(139+32)+CHR$(135+32)+CHR$(139+32)+CHR$(135
+32)+CHR$(139+32)+CHR$(143+32)
280 M$=CHR$(131+32)+CHR$(143+32)+CHR$(139+32)+CHR$(139+32)+CHR$(133+32)+CHR$(133
+32)+CHR$(143+32)+CHR$(136+32)
290 N$=CHR$(128)+G1$+G1$+G1$
510 CLS(0)
520 FOR I=0 TO 31 SET (21, I, 1):NEXT
530 FOR J=0 TO 63 SET (J, 3, 1):NEXT
540 FOR I=0 TO 31 SET (42, I, 1):NEXT
550 FOR J=0 TO 63 SET (J, 21, 1):NEXT
560 PRINT0; "1"
570 PRINT011; "2"
580 PRINT031; "3"
590 PRINT0160; "4"
600 PRINT0171; "5"
610 PRINT0191; "6"
620 PRINT0352; "7"
630 PRINT0363; "8"
640 PRINT0383; "9"
650 P1=PEEK(1024+68)-143
655 P2=PEEK(1024+79)-143
660 P3=PEEK(1024+90)-143
    
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665 P4=PEEK(1024+260)-143
670 P5=PEEK(1024+271)-143
675 P6=PEEK(1024+282)-143
680 P7=PEEK(1024+452)-143
685 P8=PEEK(1024+463)-143
690 P9=PEEK(1024+474)-143
700 IF P1=32 AND P2=32 AND P3=32 THEN GOSUB3000
705 IF P4=32 AND P5=32 AND P6=32 THEN GOSUB3000
710 IF P7=32 AND P8=32 AND P9=32 THEN GOSUB3000
715 IF P1=32 AND P4=32 AND P7=32 THEN GOSUB3000
720 IF P2=32 AND P5=32 AND P8=32 THEN GOSUB3000
725 IF P3=32 AND P6=32 AND P9=32 THEN GOSUB3000
730 IF P1=32 AND P5=32 AND P9=32 THEN GOSUB3000
735 IF P3=32 AND P6=32 AND P9=32 THEN GOSUB3000
740 IF P1=48 AND P2=48 AND P3=48 THEN GOSUB3000
745 IF P4=48 AND P5=48 AND P6=48 THEN GOSUB3000
750 IF P7=48 AND P8=48 AND P9=48 THEN GOSUB3000
755 IF P1=48 AND P5=48 AND P9=48 THEN GOSUB3000
760 IF P2=48 AND P6=48 AND P9=48 THEN GOSUB3000
765 IF P1=48 AND P6=48 AND P9=48 THEN GOSUB3000
770 IF P2=48 AND P5=48 AND P9=48 THEN GOSUB3000
775 IF P3=48 AND P6=48 AND P9=48 THEN GOSUB3000
780 IF P1=48 AND P5=48 AND P9=48 THEN GOSUB3000
785 IF P3=48 AND P6=48 AND P9=48 THEN GOSUB3000
790 AA$=INKEY$: IF AA$="" THEN 790
800 BB$=INKEY$: IF BB$="" THEN 800
810 IF AA$=CHR$(69) AND BB$=CHR$(49) THEN GOSUB4100 GOT0850
820 IF AA$=CHR$(69) AND BB$=CHR$(50) THEN GOSUB4200 GOT0850
830 IF AA$=CHR$(69) AND BB$=CHR$(51) THEN GOSUB4300 GOT0850
840 IF AA$=CHR$(69) AND BB$=CHR$(52) THEN GOSUB4400 GOT0850
850 IF AA$=CHR$(69) AND BB$=CHR$(53) THEN GOSUB4500 GOT0850
860 IF AA$=CHR$(69) AND BB$=CHR$(54) THEN GOSUB4600 GOT0850
870 IF AA$=CHR$(69) AND BB$=CHR$(55) THEN GOSUB4700 GOT0850
880 IF AA$=CHR$(69) AND BB$=CHR$(56) THEN GOSUB4800 GOT0850
890 IF AA$=CHR$(69) AND BB$=CHR$(57) THEN GOSUB4900 GOT0850
910 IF AA$=CHR$(67) AND BB$=CHR$(49) THEN GOSUB5100 GOT0850
920 IF AA$=CHR$(67) AND BB$=CHR$(50) THEN GOSUB5200 GOT0850
930 IF AA$=CHR$(67) AND BB$=CHR$(51) THEN GOSUB5300 GOT0850
940 IF AA$=CHR$(67) AND BB$=CHR$(52) THEN GOSUB5400 GOT0850
950 IF AA$=CHR$(67) AND BB$=CHR$(53) THEN GOSUB5500 GOT0850
960 IF AA$=CHR$(67) AND BB$=CHR$(54) THEN GOSUB5600 GOT0850
970 IF AA$=CHR$(67) AND BB$=CHR$(55) THEN GOSUB5700 GOT0850
980 IF AA$=CHR$(67) AND BB$=CHR$(56) THEN GOSUB5800 GOT0850
990 IF AA$=CHR$(67) AND BB$=CHR$(57) THEN GOSUB5900 GOT0850
9970 IF AA$=CHR$(12) THEN 510
9980 IF AA$="C" OR AA$="E" THEN 550
4100 **PRINT EAGLE AT 1**
4110 PRINT01.A$;
4120 PRINT033.B$;
4130 PRINT065.C$;
4140 PRINT097.D$;
4150 GOSUB6000 RETURN
4200 **PRINT EAGLE AT 2**
4210 PRINT012.A$;
4220 PRINT044.B$;
4230 PRINT076.C$;
4240 PRINT108.D$;
4250 GOSUB6000 RETURN
4300 **PRINT EAGLE AT 3**
4310 PRINT023.A$;
4320 PRINT055.B$;
4330 PRINT087.C$;
    
```

```

4340 PRINT@119,D$;
4350 GOSUB6000:RETURN
4400 '**PRINT EAGLE AT 4**
4410 PRINT@161,P$;
4420 PRINT@193,Q$;
4430 PRINT@225,R$;
4440 PRINT@257,S$;
4450 PRINT@289,T$;
4460 GOSUB6000:RETURN
4500 '**PRINT EAGLE AT 5**
4510 PRINT@172,P$;
4520 PRINT@204,Q$;
4530 PRINT@236,R$;
4540 PRINT@268,S$;
4550 PRINT@300,T$;
4560 GOSUB6000:RETURN
4600 '**PRINT EAGLE AT 6**
4610 PRINT@183,P$;
4620 PRINT@215,Q$;
4630 PRINT@247,R$;
4640 PRINT@279,S$;
4650 PRINT@311,T$;
4660 GOSUB6000:RETURN
4700 '**PRINT EAGLE AT 7**
4710 PRINT@353,P$;
4720 PRINT@385,Q$;
4730 PRINT@417,R$;
4740 PRINT@449,S$;
4745 PRINT@481,T$;
4750 GOSUB6000:RETURN
4800 '**PRINT EAGLE AT 8**
4810 PRINT@364,P$;
4820 PRINT@396,Q$;
4830 PRINT@428,R$;
4840 PRINT@460,S$;
4845 PRINT@492,T$;
4850 GOSUB6000:RETURN
4900 '**PRINT EAGLE AT 9**
4910 PRINT@375,P$;
4920 PRINT@407,Q$;
4930 PRINT@439,R$;
4940 PRINT@471,S$;
4945 PRINT@503,T$;
4950 GOSUB6000:RETURN
5100 '**PRINT CASTLE AT 1**
5110 PRINT@1,L$;
5120 PRINT@33,M$;
5130 PRINT@65,N$;
5140 PRINT@97,H$;
5150 GOSUB7000:RETURN
5200 '**PRINT CASTLE AT 2**
5210 PRINT@12,L$;
5220 PRINT@44,M$;
5230 PRINT@76,N$;
5240 PRINT@108,H$;
5250 GOSUB7000:RETURN
5300 '**PRINT CASTLE AT 3**
5310 PRINT@23,L$;
5320 PRINT@55,M$;
5330 PRINT@87,N$;
5340 PRINT@119,H$;
5350 GOSUB7000:RETURN
5400 '**PRINT CASTLE AT 4**
5410 PRINT@161,G$;
5420 PRINT@193,H$;
5430 PRINT@225,I$;
5440 PRINT@257,J$;
5450 PRINT@289,K$;
5460 GOSUB7000:RETURN
5500 '**PRINT CASTLE AT 5**
5510 PRINT@172,G$;
5520 PRINT@204,H$;
5530 PRINT@236,I$;
5540 PRINT@268,J$;
5550 PRINT@300,K$;
5560 GOSUB7000:RETURN
5600 '**PRINT CASTLE AT 6**
5610 PRINT@183,G$;
5620 PRINT@215,H$;
5630 PRINT@247,I$;
5640 PRINT@279,J$;
5650 PRINT@311,K$;
5660 GOSUB7000:RETURN
5700 '**PRINT CASTLE AT 7**
5710 PRINT@353,G$;
5720 PRINT@385,H$;
5730 PRINT@417,I$;
5740 PRINT@449,J$;
5750 PRINT@481,K$;
5760 GOSUB7000:RETURN
5800 '**PRINT CASTLE AT 8**
5810 PRINT@364,G$;
5820 PRINT@396,H$;
5830 PRINT@428,I$;
5840 PRINT@460,J$;
5850 PRINT@492,K$;
5860 GOSUB7000:RETURN
5900 '**PRINT CASTLE AT 9**
5910 PRINT@375,G$;
5920 PRINT@407,H$;
5930 PRINT@439,I$;
5940 PRINT@471,J$;
5950 PRINT@503,K$;
5960 GOSUB7000:RETURN
6000 SOUND210,1:SOUND200,1:SOUND190,1:SOUND210,1:SOUND200,4:SOUND200,4:RETURN
7000 SOUND150,1:SOUND140,1:SOUND130,1:SOUND150,1:SOUND140,4:SOUND140,4:RETURN
8000 SOUND230,3:SOUND230,3:SOUND230,2:RETURN
10000 '**PRINT INSTRUCTIONS**
10010 PRINT@9,"SUPERCROSS III";
10020 PRINT@66,"THIS GAME IS FOR TWO PLAYERS";
10030 PRINT@97,"EACH PLAYER HAS A SYMBOL - THE";
10040 PRINT@129,"EAGLE OR THE CASTLE - AND TAKE";
10050 PRINT@161,"TURNS TO PLACE THEIR SYMBOL ON";
10060 PRINT@193,"SCREEN IN THEIR CHOSEN SQUARE";
10070 PRINT@237,"PRESS";
10080 PRINT@256,"<E> FOR EAGLE <C> FOR CASTLE";
10090 PRINT@289,"FOLLOWED BY THE SQUARE NUMBER";
10100 PRINT@329,"PRESS<CLEAR>";
10110 PRINT@365,"TWICE";
10120 PRINT@390,"TO START A NEW GAME";
10130 PRINT@419,"IF THE WRONG LETTER KEY IS";
10140 PRINT@448,"PRESSED SIMPLY PRESS THE CORRECT";
10150 PRINT@491,"KEY TWICE";
10160 FORT=1T030000:NEXT:RETURN

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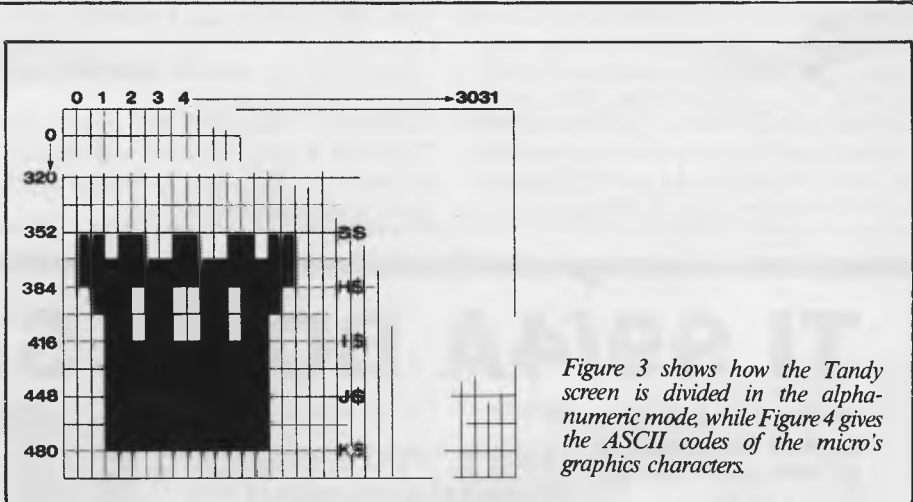


Figure 3 shows how the Tandy screen is divided in the alpha-numeric mode, while Figure 4 gives the ASCII codes of the micro's graphics characters.

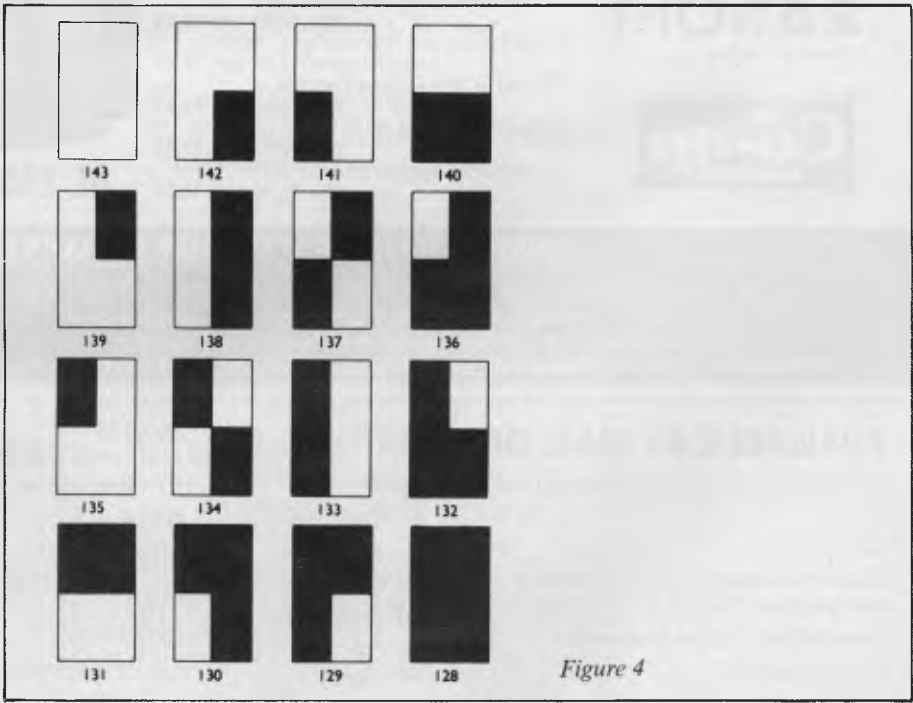


Figure 4

TANDY GRAPHICS

represented in memory by one byte, starting at memory location 1024. So screen location 0 is memory location 1024, screen location 1 is memory location 1025, and so on until screen location 511, which is memory location 1535. So it is possible to POKE data to a memory location for all character positions.

But the Tandy also has PRINT@, a very powerful tool which, together with CHR\$, can make colourful, if somewhat chunky, graphics really easy. PRINT@ places a graphics or text character on screen in any one of 512 positions.

Figure 4 shows the 16 graphics characters used with the CHR\$ function, along with their associated ASCII codes. Each can be altered from its original green and black to any one of the other seven colours available.

Resolution is not as coarse as you might think, although each character can only be black and one other colour at any given time. The character position is really divided into four elements (the 64*32 Semigraphics 4 Mode), as can be seen from figure 4, and if the characters are printed on a black background, then the black portions simply merge. You can, of course,

CLS the screen to any colour and get the coloured elements to merge, leaving your martian in sparkling galaxian black!

The syntax for PRINT@ and the CHR\$ function works like this: PRINT@ X, CHR\$(ASCII CODE + COLOR No);

where X is the screen location and the colour number is 16-yellow, 32-blue, 48-red, 64-buff, 80-cyan, 96-magenta and 112-orange.

The colour number can be added to the ASCII code beforehand if you are struggling for memory, but personally I cannot see the fun in adding numbers together while sitting in front of a machine designed to do just that. It is also much easier to recognise just which character is being PRINTed and in what colour if the PROGRAM is listed in the above format. Anyway, an extra 1.5k can always be had in this MODE by typing in the PCLEAR 3 command.

PRINT@ can also be used with text strings. Here the syntax is: PRINT@ X, "TEXT"; The string is then PRINTed with the first character, in this case 'T' at the screen location specified by X.

CHR\$ is a string function, so several graphics characters can be added together to form a composite graphics image, as shown in the examples in figures 2 and 3. A good approach is to store them in a string variable, as in:

X\$=CHR\$(129+32)+CHR\$(130+32)

Once you've typed in the Supercross game, presented here in figure 1, compare it with the sketches in figures 2 and 3, and you'll see that the above technique is used. and 3 is stored in the variable shown on the right of the sketch, and called up for PRINTing with PRINT@ when required. Program lines 100 to 270 show this string building procedure.

In this instance the method used to show all required strings on screen at the same time is to use one PRINT@ statement for each string variable, and to locate each set of statements in its own subroutine. Program lines 4100 to 4150 and 5700 to 5760 illustrate this point. The subroutine is called in this case by the use of the INKEY\$ function, so that by a single keystroke the complete graphics figure can be sited anywhere on screen instantaneously. There is positively no waiting with PRINT@.

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Since the last survey *APC* has grown and diversified. Now we need your reactions to the direction of growth.

One aspect of the survey centres on the kind of person who reads *APC*. This is necessary for the advertising department who must be able to describe our readership to potential advertisers, without whom there would be no *APC*.

So, in order to give you the best possible service and the opportunity to influence *APC*'s direction, we ask you to fill in and send us the questionnaire without delay.

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1983 READER SURVEY

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6502 matrix transposition

The challenge issued in August Sub Set to transpose a matrix in its own space has prompted the submission of a fairly good reason for turning arrays from Dr M J McCullagh and an 'own space' transposition routine from Vernon Webb.

As a lecturer in Geography, Dr McCullagh uses array grids of heights to represent terrain. Obtaining views of the same area from different locations requires the arrays to be rotated, usually in 90° twists. On micros with limited memories, these rotations have to be carried out within the original matrix space.

TRANS from Vernon Webb is a routine to transpose rather than rotate — that is, it changes linear storage from row after row to column after column. Apart from a few bytes of page zero use for pointers and temporary variables, no work-space other than the memory used by the original matrix is needed.

But is the algorithm used by TRANS the most efficient for such a transposition? The number of exchanges is small for very small matrices (5 exchanges for a 2 by 3 matrix) but increases rapidly — 105 exchanges are needed for a 4 by 6 matrix. Is there an algorithm to transpose or rotate an m by n matrix in only mn exchanges?

DATASHEET

```

;= TRANS = Own-space Matrix Transposition
; CLASS: 2 (not re-entrant, M4 to M8 corrupted)
; TIME CRITICAL?: No
; DESCRIPTION: Transposes a 2-dimensional array or matrix in
;              RAM. Sequential row storage becomes sequential
;              column storage, or vice versa. Maximum number
;              of elements is 256.
; ACTION: For each column (j) do:
;         For each element (i) in column j do:
;         Move element at (i) to new position at (j),
;         right shifting intermediate elements 1 to i-1
;         to i+1 to i.
;         Next i until i=j - 1.
;         Next j until j=n - 2.
; SUBR DEPENDENCE: None
; INTERFACES: RAM used for matrix.
; INPUT: M0,M1 = address of matrix
;         M2 = number of rows (m)
;         M3 = number of columns (n)
;         (m * n must not be greater than 256)
; OUTPUT: Matrix at (M0,M1) transposed in own space.
; REGS USED: M0 to M8 inclusive.
; STACK USE: 4
; LENGTH: 102
; PROCESSOR: 6502

TRANS:   PHP           ;save registers.           08
         PHA           ;                          08
         TYA           ;                          08
         PHA           ;                          08
         TXA           ;                          08
         PHA           ;                          08
         LDA   #SFF    ;initialise column pointer 1 to  A9 FF
         STA   M4       ;=1 for zero value in loop when  85 22

```

```

LDA   #0           ;first used.                   A9 00
SEC           ;initialise column start disp.       38
SBC   M2          ;id to =m for zero value in loop  E5 22
STA   M5          ;when first used.               85 22
NEWCOL: INC   M4          ;column count to next column. E6 22
        LDA   M5          ;calculate displacement to column A5 22
        CLC           ;start from matrix start.     18
        ADC   M2          ;                          65 22
        STA   M5          ;                          85 22
        STA   M8          ;initialise 1 to col start disp. 85 22
        LDA   #0          ;initialise element index 1    A9 00
        STA   M6          ;to zero.                  85 22
NEWEL:  INC   M6          ;next element in column.     E6 22
        LDA   M5          ;get id and use it to calculate A5 22

```

Unspecified OP codes

For a full report on unspecified 8085 instructions (Sub Sets for February and August 83) both Steven Moore and M J Colley refer us to an article, published in Dr Dobb's *Journal of Computer Calisthenics & Orthodontia*, Number 34.

Steven was told by Intel that the company could not guarantee that these unspecified instructions would work on every 8085 processor.

We also made fleeting reference in February to the unspecified Z80 instructions dealing with separate halves of the IX and IY registers. James Owen and Peter Mortimore have been a bit more explicit about this. Instructions normally operating on the H register can be used to operate on the high order byte of IX if preceded by DDH or the high order byte of IY if preceded by FDH. Instructions operating on the L register operate on the low order bytes if preceded by DDH or FDH.

Relocating Z80 code

While presenting this series we have met with some pleasing coincidences. Sometimes two readers from different parts of the country submit, on the same day, routines which do exactly the same job. Sometimes a reader sends in an idea that fits perfectly into another contribution we are writing about at that time.

For example, quite recently, I was about to give a copy of one of my programs to someone I know, when I realised that person didn't have on his machine the high memory locations my program was in. I promised to relocate it for him the next day, intending to reassemble it from source code I had taped some years ago. The source code didn't read in correctly, so I was just about to start the tedious job of copying the program from

one area of memory to another and altering all the affected addresses when RELOC, from Tim Watson dropped through the letter-box. It did the job for me and is printed here.

RELOC uses Bruce Tanner's subroutine, LENGTH (Sub Set March 83) to give the length of each Z80 instruction. It moves the Z80 code in memory and changes jump and call addresses if they are within the memory locations of the code being moved. Also, since 16-bit numbers are usually pointers to memory, the operands of 16-bit load

immediate instructions are changed.

The program that was relocated started with a number of text strings, which had to be included in the memory area operated on by RELOC, so that load immediate instruction addresses pointing to the text would be adjusted. None of this text was altered by RELOC, as most ASCII codes do not correspond to op codes that would be followed by addresses. One that could cause trouble is 21H for ASCII exclamation mark and for the op code to LD HL,NN.

DATASHEET

```

RELOC - Relocate code in memory.
CLASS: 2 (does not save any registers).
TIME CRITICAL?: No
DESCRIPTION: Moves a block of code from one area of memory
to another, adjusting jump and call addresses
and 16-bit load immediate instruction operands
that fall within the memory locations of the
code being moved.
ACTION: Move the code to the new area.
Get the length of the 1st. instruction.
If less than 3 bytes then ignore it.
If the length is 3:bytes and the 1st. byte is not
DDH or FDH then do a relocation correction if the
address is in the program range.
If the length is 4 bytes and the 2nd. byte is not
36H or CBH then do a relocation correction if the
address is in the program range.
Get the next instruction and repeat process.
SUBR DEPENDENCE: LENGTH.
INTERFACES: None.
INPUT: BC points to the start address of the code to be moved.
HL points to the last byte of the code to be moved.
DE points to the new start address.
OUTPUT: The relocated code.
REGS USED: ALL.
STACK USE: 8
LENGTH: 119
PROCESSOR: Z80

```

```

RELOC:  PUSH DE           ;store new start          D5
        PDP  IY           ;address in IY and         FD E1
        PUSH DE           ;save for later use.       D5
        OR   A             ;clear carry flag.        B7
        SBC  HL,BC         ;gives no. of bytes of code-1. ED 42
        PUSH HL           ;swap                          ES
        PUSH BC           ;HL                          C5
        POP  HL            ;and                          E1
        POP  BC           ;BC.                            C1
        INC  BC            ;gives no. of bytes to move.   O3
        LDIR A             ;move the code.                ED B0
        DR   A             ;clear carry flag.            B7
        PUSH DE           ;save new end address + 1.      D5
        EX  DE,HL         ;get end address + 1 in HL     EB
        SBC  HL,DE         ;work out displacement of code. ED 52
        LD  B,H           ;save displacement.            44
        LD  C,L           ;in BC.                        4D
        POP  DE           ;restore new end address + 1.   D1
        EXX                ;save DE and HL for later.    D9
        PDPP HL          ;get new start address.         E1
LOOP:   PUSH HL           ;save pointer to next op code,  E5
        PUSH HL           ;twice.                        E5
        CALL LENGTH       ;get length of instruction.    CD ZZ ZZ
        POP  HL           ;restore pointer to op code.    E1
        LD  A,E           ;get instruction length into A.  7B
        PUSH DE           ;save instruction length.       D5
        CP   +3           ;3-byte instruction?          FE 03
        JR  C,INCPTR      ;jump if 1 or 2 byte instr.   38 43
        LD  A,(HL)        ;get 1st. byte of instruction.  7E
        JR  Z,BYTES       ;jump if it is 3-byte.        28 10
        INC  HL           ;point to second byte.         23
        CP   0EDH         ;1st byte EDH?                FE ED
        JR  Z,DDLOC       ;if so, do relocate.          28 13
        LD  A,(HL)        ;get 2nd. byte.                7E
        CP   0CBH         ;is 2nd. byte CBH?            FE CB
        JR  Z,INCPTR      ;if so, jump to ignore.       28 36
        CP   36H          ;is 2nd. byte 36H?            FE 36
        JR  Z,INCPTR      ;if so, jump to ignore.       28 32
        JR  DOLOC         ;otherwise do relocate.        18 08
BYTES:  CP   0DDH         ;is it an IX instruction?     FE DD
        JR  Z,INCPTR      ;if so, jump to ignore.       28 2C
        CP   0FDH         ;is it an IY instruction?     FE FD
        JR  Z,INCPTR      ;if so, jump to ignore.       28 28
DOLOC:  INC  HL           ;point to lower address byte.   23
        LD  C,(HL)        ;put byte in C.                4E
        INC  HL           ;point to higher byte.         23
        LD  B,(HL)        ;put it in B.                  46
        PUSH BC           ;put address into              CD
        POP  IX           ;IX register.                   D5 E1

```

```

EXX                ;now need displacement.                D9
ADD  IX,BC         ;work out new address.                DD 09
EXX                ;save displacement again.            D9
PUSH IX           ;address into                          CD E5
PDP  BC           ;BC.                                  C1
PUSH HL           ;save where to put BC.                E5
PUSH IY           ;new start address                    FD E5
POP  HL           ;into HL.                             E1
OR   A             ;clear carry flag.                   B7
SBC  HL,BC         ;check if BC > HL.                   ED 42
POP  HL           ;get back where to put BC.            E1
JR  Z,EQST        ;jump if BC=new start address.       28 02
JR  NC,INCPTR     ;jump if BC out of range.             30 0E
EQST:   PUSH HL           ;save HL.                      E5
        PUSH BC         ;save BC.                        C5
        EXX                ;get new end address + 1.     D9
        POP  HL         ;address into HL.                E1
        OR   A             ;clear carry flag.            B7
        SBC  HL,DE         ;check if BC < HL.             ED 52
        EXX                ;save new end address;        D9
        POP  HL         ;get where to put BC.            E1
        JR  NC,INCPTR   ;jump if BC out of range.       30 03
        LD  (HL),B       ;put higher byte in memory.     70
        DEC  HL           ;point to lower byte position.  2B
        LD  (HL),C       ;put lower byte in memory.     71
INCPTR: POP  DE           ;get length of instruction.     D1
        POP  HL         ;get address of the instructn.   E1
INC:    INC  HL         ;point to next position.        23
        DEC  E           ;counter = counter - 1.         1B
        JR  NZ,INC       ;jump if HL not at op code.     20 FC
        PUSH HL         ;save position of next op code.  E5
        EXX                ;get new end address + 1.     D9
        POP  HL         ;get address of next op code.    E1
        OR   A             ;clear carry flag.            B7
        SBC  HL,DE         ;compare with new end addr+1. ED 52
        EXX                ;save new end address + 1.   D9
        JR  C,LODP       ;jump if another instruction.   38 A2
        RET                ;done.                       C9

```

Elegant solution invited

In this problem, the target byte holds information which determines how four graphics dots are to be displayed as either background (not showing) or as one of three colours. This dot information is held in the least significant 2 bits of a byte, which represent the four states 00, 01, 10 and 11 with the six most significant bits of the byte reset. The information for the dots, which are numbered 0 to 3, is arranged in the target byte thus:

bit 7 6 5 4 3 2 1 0

dot 0 1 2 3 0 1 2 3

Dot 0 information is in

bits 7 and 3 of the byte, dot 1 in bits 6 and 2, dot 2 in bits 5 and 1 and dot 3 in bits 4 and 0.

Given a 2-byte address of the target byte, a 1-byte dot number (binary 0 to 3) and 1 byte of dot information (wherever you like in either registers, memory, or as parameters embedded in the code following the subroutine call), we want the most elegant routine to place the dot information, according to dot number, in the target byte, without disturbing any of the information relating to the other three dots.

Those of you with the right hardware will recognise the format of the target byte as that used in display modes 1 and 5 of the BBC Micro. So solutions in 6502 code will be particularly relevant, though solutions in other code will be interesting.



'You're sure he wouldn't prefer a video game?'



BANKS' STATEMENT

THE SEVEN AGES

Martin Banks believes micros have a long way to go in the refinement process.

I've been sitting here wondering if I have the nerve to suggest that the personal computer is, perhaps, the worst thing that ever happened to personkind. The old mainframe computers were bad enough; after all when such machines were first developed it was thought that there might be applications for half a dozen of them around the world. But now, all these personal computers are just making the situation horrendous.

In offices and shops all over the country, all around the world, there are small computers cranking away at all sorts of terribly important jobs, all intent upon making life easier, more efficient, more tolerable, more generally neat and tidy for their hard pressed and harassed owners. They are adding at an exponential rate to the amount of terribly important jobs being performed already by mainframe and minicomputers in the vain hope that things will get even easier, more efficient, more tolerable and more neat and tidy.

When thinking these thoughts I am, for the time being, dismissing the vast plethora of home computers that now infest the country. They can be dismissed because they are generally being employed for the sole purpose of running excruciatingly brain-numbing games programs. These tend to keep people off street corners and away from thinking about doing anything 'real' or 'meaningful'. Once home computers join in with the mainframes, minis and personal systems in attempting to make things neat and tidy for us, that may well be the time to bail out.

All these computers have been sold, and are being sold, to unsuspecting owners on the basis that they are somehow going to make life so much easier, more tolerable, and so on. Yet I suspect that they are, in practice, achieving the exact opposite, and will continue to do so for some time.

To explain why I feel this is the case will entail me in waxing philosophical for a moment. I realise that it is presumptuous of me to postulate the concept that I can wax philo-thingie, but I shall attempt to anyway.

Let us assume that the path to be taken by the human race, collectively, is towards some form of greater wisdom (whatever that wisdom may be found to constitute on arrival). This is, after all, the fundamental tenet of most of the world's religions and philosophies, so maybe there is something in it. If this is accepted then it can also be assumed that the artefacts and experiences

we gather and keep around us, both individually and collectively, will be those that can be considered likely to help us on this 'journey'. Since it has not been dismissed as a passing fad, like the hula hoop, the computer in all its guises may presumably be considered as an artefact we have collectively taken to be 'useful'.

But is it? To shoot off at another tangent for a second, look up 'wisdom' in the Concise Oxford Dictionary: *possession of experience and knowledge together with the power of applying them critically or practically*, it says. Does the computer actually help us with any of this? Certainly it can apply the power to use experience or knowledge, but use it critically or practically? Not really. Does it supply the knowledge? Well, at first this looks more promising, but again the dictionary helps us. To 'know' is (among other things) being able to distinguish, which in this context means making decisions about, and/or between a limitless variety of experiences. Though at first sight this might seem to be where the computer fits in, it has (as some people insist on saying about other people) a long way to go.

For there are, in my own humble opinion, two stages that precede knowledge, in the same way that knowledge precedes wisdom. These are information and, at the bottom of the pile, raw data. From a distance it is possible to see the tidy linear progression from raw data, through information and knowledge, and on to wisdom. Once you get inside it, however, in everyday living, the picture gets to be much more cluttered, and this is where the computer is actually a hindrance rather than a help.

You see, the vast majority of computer systems are being used to produce raw data, intergalactically vast globs of the stuff. One or two are being used to produce information, it is true, but the majority are just stuck there churning out data — and are starting to get in the way, for most people have no idea what to do with the stuff.

They don't know, not because they are intellectually incapable, but because there is so much of the stuff around now that it is impossible to wade through it effectively. Here is an example. A business person often used to make decisions on a purely empirical basis, but felt that this was inadequate, that opportunities were being missed because of lack of information. Maybe much time was spent seeking

additional data just in case. So, sold on the idea of a computer, one is purchased. Now there is data in abundance: databases, spreadsheets, modellers, etc, churn the stuff out endlessly. The business person is left holding so much data, most of which apparently points in different directions, that a rational decision based on this input becomes all but impossible.

The time is coming for the computer industry to sit back and consider what it is actually selling to the market, and what it ought to be selling, for I feel that the time is fast approaching when the industry must think in terms of defining 'knowledge' as a product, and create systems that provide it.

To give some idea of what I mean, let me take one more digression. Examine for a moment what you are reading right now. It is a magazine called *Australian Personal Computer* which has been written and edited by people who have a strong interest in the subject of computers, and, to a greater or lesser degree, know a considerable amount about them. By reading this magazine you are acquiring not just information, but filtered and applied information, which can be considered knowledge.

It is filtered by the existing knowledge and experience of the people writing and editing it, and it is filtered in a certain way. At the broadest level of filtering it is about things pertaining to personal computers, so if that is the subject in which you are interested, you will understand from just the title of the magazine that this is probably a better place to look for information than, say *Wheels*.

But *APC* looks at personal computer business in a certain way and filters the information it receives accordingly. Though it has good coverage of games programs, it also covers business applications and other subsets of the industry. If your interest is only in one specific subset then the filtering provided by *APC* may not be enough (or indeed may be too much), and an alternative source of information, tailored more precisely to your needs, may be required.

All this may sound terribly obvious, and it is, until you have seen the inside of an editorial office and participated in this filtering process. Such offices are habitually the depository for every press release ever written by anybody who ever thought they might get something in the papers. They range from the immediately relevant

BANKS' STATEMENT



Illustration by Ivan Allen

they might get something in the papers. They range from the immediately relevant — brand, new personal computer announcement — to the frankly inane. They take in every stop in between as well. They all have to be read and filtered by the knowledge and experience of the editors (don't laugh, it's true).

To see how this is important, try to imagine what the alternative would be like. Imagine receiving your copy of *PCW* every month to find it filled with every press release that had been received. They would appear in the magazine in order of receipt through the post and would be 'pasted down' onto the page with no consideration given to content nor subject matter. Finding what you wanted among this morass of raw data would be your responsibility.

The point of all this digression is that computers are still at the level of providing a platform or format for raw data (in the above example that would be analogous to the pages of the magazine). Rarely do they rise above this to even the first level of filtering, let alone move on to what most users really need. Among other facilities, this is the ability to specify randomly any criteria that come to mind for selecting, from a vast pot of raw information, only those bits that are required.

Now I know there will be many people within and without the industry who will jump up and down and say 'databases' very loudly, and I will say 'No, I don't think so.' Databases are good for storing and retrieving related data that the user already knows about. What they are not much good at is doing something journal-

ists (for example) do all the time. That is, making connections (sometimes silly, sometimes fatuous, but sometimes inspired) between apparently disparate bits of information that no one 'knew' they were looking for.

A computer product that offered that sort of facility would be starting along the road to exploiting knowledge properly. It is from the ability to make such connections that most development and growth towards 'wisdom' has come. It is a mark of this 'wisdom' that, in humans at least, the ability to know of things (facts 'n' info) and retrieve them at will (like a database) does not represent either knowledge or wisdom. As much as anything, this comes from knowing what information to get rid of. Now, someone needs to teach computers . . .

END



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MEMORY: 64K comprising of 8K ROM, 4k graphics and screen memory.

DISPLAY: Direct video to external monitor or modified TV. 80 by 24 and 64 by 16 character display modes, high resolution PCG graphics to 512 by 256 pixels. Upper and lower case with full programmability at any screen location.

SOFTWARE: CP/M 2.2, MICROSOFT BASIC-80, WORDSTAR 3.0, MULTIPLAN V1.05, MICROWORLD BASIC V6.0, WORDBEE, EDASM, CP/M UTILITIES, COMMUNICATIONS PACKAGE, MICROWORLD SUPPORT LIBRARY.

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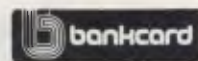
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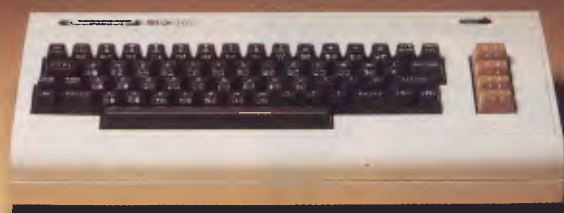
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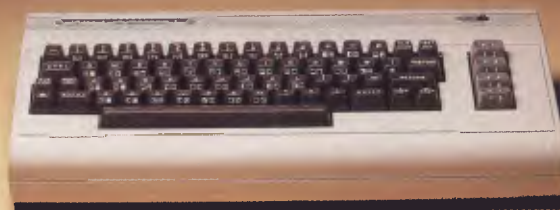




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VIC-20 machine code routines

Here are some routines that a VIC-20 machine code enthusiast may find useful.

What follows is a brief description.

1 &D1AA This converts a floating point number in the floating point accumulator into an integer held in standard low/high byte format in the Y register and the A register.

2 &D391 This converts an integer held in the Y and A registers into a floating point number and puts it into the floating point accumulator. It is exactly the opposite to the first routine.

These two routines are useful because the argument to the `USR(X)` function is placed in the floating point accumulator. These routines therefore allow you to easily pass a parameter to a piece of your own code, and also

pass one out to Basic, since the result given to Basic is whatever number is left in the floating point accumulator on returning from your machine code routine.

3 &DDDD This routine takes the floating point number held in the floating point accumulator and converts it into an ASCII string, starting at &0100. The end of the string is marked by a zero byte. The number is not printed, however, so unless someone knows of a routine to do this, the following machine code routine can be used.

```
LDX#&00      ;Initialise X
              ;reg digit
LDA&0100,X   ;Load
              ;accumulator
              ;from location
              ;plus X
INX          ;Next char
JSR&FFD2    ;Print the ACII
              ;char in A
BNE digit    ;If char is not
              ;zero then next
              ;char
```

Andrew Dilley

at the bottom of the page. The operation should be carried out carefully, since a wrong connection could possibly damage the input/output chip. Used wisely, this

simple procedure can save many hours and a good deal of frustration.

S A Sassoon

Sirius tips

The Microsoft Basic 86 manual (part no 100946-01 June 1982) supplied with the Sirius 1 does not show how to use some of the computer's more interesting features.

The Sirius 1 is capable of displaying its extensive character set on the screen in high intensity, reverse video, underline and any combination of these. The escape function `CHR$(27)` allows the appropriate control character to be sent to the display processor, and is listed in Fig 1.

The MS-DOS operating system (version 1.25 release 2.5x) has a built-in software clock that is normally re-set by the user on switch-on and

is used by MS-DOS to time and date files saved on disk. It is possible to use this clock from Basic 86 (Rev 5.25 dated 26 May 82) as follows:

`PRINT DATE` returns the day number, e.g. 1st January gives 1, 31st December gives 365 or 366 in a leap year. `PRINT DATE$` returns the date in the usual US format, e.g. 12-31-1983 for 31st December 1983.

`PRINT TIME` returns the time of day in seconds, e.g. 00:34:36 gives 2076. `PRINT TIME$` returns the time of day in hours, minutes and seconds in 24-hour clock format, e.g. 13:05:59.

It should be possible to get the day out as well, i.e. Mon, Tue, Wed but the obvious

Recovering the Commodore 64

It is not difficult to crash the Commodore 64 so that the `RUN/STOP` and `RESTORE` keys fail to recover the computer. There is, however, an alternative to switching off and losing your program.

By momentarily connecting the `RESET` pin on the user port to the `GND` pin with a piece of wire, the 64 does a 'cold start'. After a

couple of seconds, the familiar screen will be displayed as if the machine had just been switched on. Any machine code program, except those stored in the tape buffer locations, will remain intact. A Basic program can be recovered using an `OLD` command.

Check page 143 of the user manual for the correct terminals of the user port. The `GND` and `RESET` pins are marked 1 and 3 respectively on the diagram

```
Clear screen, home cursor
Clear screen
Move cursor up one line
Move cursor down one line
Turn on flashing cursor
Turn off flashing cursor
Turn on high intensity
Turn off high intensity
Turn on reverse video
Turn off reverse video
Turn on underline
Turn off underline
Turn on special lower case
Turn off special lower case
Fig 1
```

```
PRINT CHR$(27);"E"
PRINT CHR$(27);"b"
PRINT CHR$(27);"A"
PRINT CHR$(27);"B"
PRINT CHR$(27);"2"
PRINT CHR$(27);"3"
PRINT CHR$(27);"("
PRINT CHR$(27);")"
PRINT CHR$(27);"p"
PRINT CHR$(27);"q"
PRINT CHR$(27);"0"
PRINT CHR$(27);"1"
PRINT CHR$(27);"F"
PRINT CHR$(27);"G"
```


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SIRIUS.BAS

```

10 REM ROUTINE TO DISPLAY SIRIUS LOGO
20 PRINT CHR$(27);"E"
30 DEF SEG = &HF000
40 ROW% = 9
50 COL% = 30
60 LOGO% = 36
70 C% = COL% * 2
80 FOR J% = 1 TO 3
90 R% = ROW% * 80 * 2
100 FOR I% = 0 TO 20
110 POKE (R% + C% + (2 * I%)), (LOGO% + I%)
120 POKE (R% + C% + (2 * I%) + 1), 64
130 NEXT I%
140 LOGO% = LOGO% + 21
150 ROW% = ROW% + 1
160 NEXT J%
170 END
    
```

Fig 2

Poke Value	Font	Character Displayed
36 to 98	0	SIRIUS LOGO
101 to 132	0	CHR\$(95) — CHR\$(126)*
133 to 255	0	CHR\$(33) — CHR\$(155)
0 to 99	1	CHR\$(156) — CHR\$(255)

* special lower case characters

Fig 3

Bit	Value	Attribute
MSB	128	0 = Normal, 1 = Reverse Video
	64	1 = High Intensity, 0 = Normal
	32	00 = Normal, 10 = Underline*
	16	
	8	Future Character Fonts
	4	
	2	
LSB	1	0 = Font 0 1 = Font 1

* combinations 01 and 11 not valid.

Fig 4

Poke	Font		Inverse	HInten	Underline
	Font 0	Font 1			
0	1	no	yes	no	
32	33	no	yes	yes	
64	65	no	no	no	
96	97	no	no	yes	
128	129	yes	yes	no	
160	161	yes	yes	yes	
192	193	yes	no	no	
224	225	yes	no	yes	

Fig 5

PRINT DAY or PRINT DAY\$ do not seem to work.

The character set supplied with the Sirius on the MS-DOS disk appears to be similar to the IBM PC (see Tim Field's article in *Byte* pp 331-376 March 1983 'A Peek into the IBM PC'). The

characters not available from the keyboard can be displayed using PRINT CHR\$(A%) where A% is in the range of 32 to 255 and corresponds to the ASCII code for the normal alphabet. On the IBM PC, values 0-31 give a further 32

T.J.'s Workshop

'POKECSET.BAS'

```

10 REM DISPLAYS POKE CHARACTER SET 0 TO 255
20 REM USES ATTRIBUTES 0,1,16,17, ...
30 DEF SEG = &HF000
40 PRINT CHR$(27);"E"
50 FOR I% = 0 TO 255 STEP 16
60   FOR J% = 0 TO 15
70     ROW% = J%
80     CHAR% = I% + J%
90     FOR K% = 0 TO 255 STEP 16
100      FOR L% = 0 TO 1
110       ATTRIB% = K% + L%
120       COL% = (K%/4) + (L%*2)
130       LOCAT% = (ROW%*80*2) +
          (COL%*2)
140       POKE LOCAT% + 1, ATTRIB%
150       POKE LOCAT%, CHAR%
160       NEXT L%
170     NEXT K%
180   NEXT J%
190 NEXT I%
200 END

```

Fig 6

'SCRLINE.BAS'

```

10 REM DISPLAYS FUNCTION KEY LABELS ON
   SCREEN LINE 25
20 PRINT CHR$(27);"E"
30 DEF SEG = &HF0F0
40 FOR I% = 0 TO 79
50   POKE (I%*2), 227
60   POKE ((I%*2)+1), 208
70 NEXT I%
80 FOR I% = 0 TO 77 STEP 11
90   POKE ((I%*2)+1), 80
100  POKE ((I%+1)*2)+1, 80
110  POKE ((I%+6)*2)+1, 192
120 NEXT I%
130 POKE ((79*2)+1), 80
140 POKE 6*2, 149
150 POKE 17*2, 150
160 POKE 28*2, 151
170 POKE 39*2, 152
180 POKE 50*2, 153
190 POKE 61*2, 154
200 POKE 72*2, 155
210 END

```

Fig 7

characters; however, the Sirius uses these for the non-printable ASCII commands such as 'escape', CHR\$(27). It is possible to display the remaining 32 characters by means of the sequence PRINT CHR\$(27);"F"; CHR\$(A%) where A% is in the range 94 to 125.

The Sirius logo is really made up of three rows of

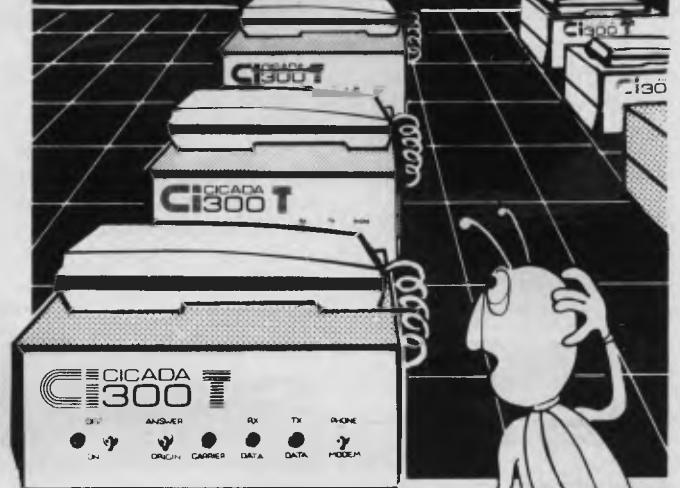
characters and can be displayed anywhere on the screen using the program shown in Fig 2.

The program makes use of the POKE command to alter directly the values stored in screen RAM. The screen RAM is a 4k byte block from F0000 to F0F9F. Two eight bit bytes (or octets) are used for each character displayed.

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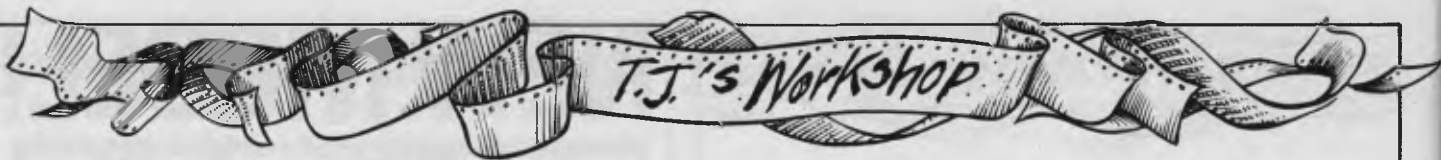
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The first at, say, F0000 gives the character and the second at F0001 gives the attributes and the font.

The value to be POKEd to screen RAM is not the ASCII value. The table in Fig 3 shows the values to use for the first memory location.

The second memory location has one bit to control each attribute, as shown in Fig 4.

To get the combination required, the attributes are added up as shown in Fig 5.

The program in Fig 6 displays all the characters in fonts 0 and 1 in all eight combinations of the attributes shown in Fig 5.

The 25th line of the screen

is protected from being written over by ordinary program listing or print statements; it can be used to display semi-permanent messages to the user. This is useful in menu type programs when it is often helpful to remind the operator which main menu selection is in use. Another possibility is to display the labels for the function keys.

The program shown in Fig 7 clears line 25 of any previous text and displays seven labels for the function keys. The hex address F0F00 points to the first location of line 25 in screen RAM.

John Lane

```
10REM CHANGE PROMPT
20FOR T=828 TO 828+25
30READ A:POKE T,A
40NEXT T
50DATA169, 160, 133, 252,
    169, 0, 133, 251, 160, 0, 177,
    251, 145, 251
60DATA200, 208, 249, 230,
    252, 165, 252, 201, 192, 208,
    239, 96
70SYS828:REM COPY ROM
    TO RAM
```

```
80REM DEMO
90POKE43846,92:POKE1,54
100INPUT"HOW MUCH
    MONEY";M
110POKE1,55
```

Note that it is also possible to use colour codes as prompts!

David Gristwood

BBC Basic values and function

If you've ever wanted to pass more than two values out of a function in BBC Basic, here is one method. FNMLT is the example function out of which the values are to be passed. FNLFT and FNRT produce the values.

```
10PRINT FNLFT
(FNMLT)+FNRT(FNMLT)
20END
100DEFFNLFT (A$)
110LOCAL T,LS
120FOR T= 1 TO LEN(A$)
130IF MIDS(A$, T,1)="
"THEN
LS=LEFT$(A$,T):T=LEN
(A$):GOTO 140
```

```
140NEXT
150=VAL(LS)
160DEFFNRT(A$)
170LOCAL T,LS
180FOR T=1 TO LEN(A$)
190IF MIDS(A$, T, 1)="
"THEN LS=RIGHTS
(A$,LEN(A$)-T):T=LEN
(A$):GOTO 200
200NEXT
210=VAL(A$)
1000DEFFNMLT
1010A=10
1020B=20
1030=STR$(A)+" "+STR$(B)
```

Note that the program is only an example and because of this appears inefficient. If numerous functions need to pass multiple variables then the above process becomes more attractive.

Julie Dayton

Alternative 64 INPUT

Here is a way of changing the prompt character (normally a question mark) on the Commodore 64. Enter the following few lines into the program, near the beginning (before an input is required). When RUN this

program copies the Basic ROM to the RAM beneath. When you wish to change the prompt, before an input:

```
POKE 1,54
Then POKE the location
43846 with the CHR$ code of
the character required, thus
for a pound sign —
POKE 43846,92
After the INPUT statement,
always POKE 1,55
```

Commodore cursor change

Commodore 64 owners may find the following a novelty, but I am sure that they could find some use for it. The following short routine allows you to change the cursor from a flashing square to any symbol you like, depending on the background character. The new cursor is activated with POKE 789,192 and returned

to normal with POKE 789,234.

Poking the location 49245 with a value in the range 0 to 255 will produce a range of new cursors.

A flashing pound sign is a good prompt for an amount of money to be entered.

You can also change the rate at which the cursor flashes, by altering the value of location 49213 from its normal value of 20 (1 is very fast flashing).

David Gristwood

POKEing around on your VIC 20

While using my VIC-20, I have found some useful Pokes. Here is a list of some of them. I hope they are of use to somebody.
POKE 808,127 Disables the RUN/STOP key.
POKE 808,112 Re-enables the RUN/STOP key.

POKE 650,255 Makes every key repeat.
POKE 650,0 Sets repeat function to normal.
POKE 649,0 Disables the keyboard.
POKE 649,10 Re-enable the keyboard.
Also SYS 64802 returns the screen back to what it was like when the computer was turned on. This also NEWs any program in memory.

J C Chasey

ZX printer labeller

Having recently acquired a ZX Printer for my Spectrum, I decided to put it to some practical use. The program shown here will print a

cassette label on the screen, which can then be COPYed to the printer.

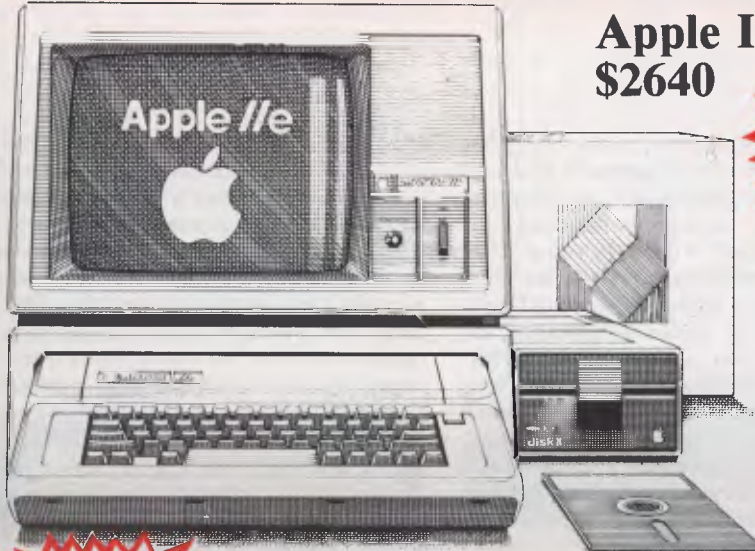
The label can be numbered and lettered before COPYing using: PRINT AT 4,3: "any number".

P Niblock

```
10 PLOT 15,150: DRAW 224,0: DR
AW 14,-14: DRAW 0,-98: DRAW -252
,0: DRAW 0,98: DRAW 14,14
20 PLOT 65,105: DRAW 0,-45,PI
30 PLOT 191,105: DRAW 0,-45,-PI
40 DRAW -125,0
50 PLOT 65,105: DRAW 125,0
```


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PHOTOFIT

By pretending to be a chemist and an ambulance driver John Higgins discovered a potential goldmine of software for the teaching of communications skills. Here's your treasure map and a sample program which invites you to join in the search for a notorious villain . . .

Computers are educational, or so we say when we try to justify buying them for our families. When it comes to buying software we may be disappointed. The programs one finds in the education section of the software catalogue generally do not teach; they test and even that is something they don't always do well. No wonder some teachers, parents and learners continue to be sceptical.

Language learning programs are a case in point. Nowadays language teachers believe that pure memory work must be balanced by at least an equal amount of time spent on activities where communication is the focus so that in the modern classroom one is likely to find people engaged in role-playing, problem solving, listening to authentic recordings and playing games. It is not now thought necessary to correct all mistakes on all occasions. Learners of any skill need opportunities to try out their newly acquired knowledge in order to communicate, and the computer can provide such opportunities.

The communication activities I have described are not only appropriate to language learning: indeed there may be masses of useful material designed for other subjects which, by translating the instructions, can be converted into language learning material.

I recently visited the Control Data Corporation in order to see a demonstration of the CAL resource called PLATO. I was shown exercises on dangling modifiers and French irregular verbs, all of the drill-and-practice type, and was making polite noises and looking for an excuse to leave when I was asked 'Do you want to see any of our science material?' I agreed, and they called up a fractional distillation experiment. I had to assemble a diagram of the apparatus on the screen and control the distillation temperature while the computer reported back on the purity of the distillate. Next I tried an ambulance driver simulation and, since versions were available in English and French, I opted for

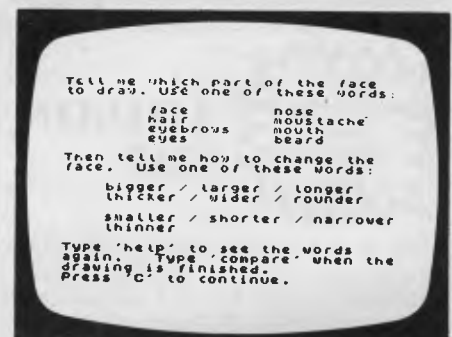
French. I was summoned to the scene of an accident, told what equipment and supplies were in my ambulance and allowed to question the witnesses, including the victim's girlfriend—ooh la la! I so enjoyed chatting her up that the poor victim died, but in the course of the ninety seconds or so that passed in pleasant dalliance my French was exercised as never before. Here then was superb language teaching material unlikely ever to be used as such because it didn't appear in the language section of their catalogue. The same must be true in many schools. The science, geography and economics departments are likely to hold such buried treasures.

Many such programs must exist which can be used not only to fulfill their avowed function but to potentiate the kind of communication activity required for improved language learning, either in solo or group use. In the latter case two kinds of communication occur, the simplified formulaic utterances typed into the machine and the free conversation between group members as they discuss what to do next. The computer is both something to talk to and something to talk about. The added urgency of getting one's point of view across to the chap who is hogging the keyboard is a further stimulus to communication.

Photofit (for the 16k Spectrum) illustrates the kind of application program which, when used out of context, provides a game-like activity which will get people talking. More (much more!) sophisticated versions of this kind of program are used by modern police forces around the world, but the primitiveness of the drawing makes little difference to the educational value or the fun of the activity. It has been used with great enthusiasm by the overseas students with whom I work—they did not demand a Laughing Cavalier or an Al Capone. Though I wrote it originally for foreign students of English, I have also written a French version for the 48k Spectrum.

The program begins by drawing a random face on the left-hand side of the

screen over the message 'This is Bill Bolt the Burglar. Study his face carefully. Later you must help me draw it.' This is followed by a frame of instructions, after which the screen blanks out and displays the prompt 'Instructions please'. The user types in a word for a feature, for example, 'face'. The computer now draws a face outline on the right-hand side of the screen. The user can leave this alone or change it by typing in



PHOTOFIT

'larger' or 'smaller' or 'wider' or 'narrower', in which case the face is redrawn. Now the user types in the word for another feature, say, 'hair'. Some hair is drawn over the face. If the student now asks for the hair to be 'bigger', the machine will respond 'I can't draw bigger hair'. The student has to find the right word, which in this case is 'longer'. At any stage he can type 'help' which provides a list down the left-hand side of the screen of all the words the computer will recognise. When he has added 'eyebrows', 'eyes', 'nose', 'ears', 'mouth', and perhaps 'moustache' and 'beard', he can type 'compare'. Now the computer redraws the original face of Bill Bolt on the left-hand side, and lists all the differences below, for example, 'Bill's hair is shorter. Bill's nose is wider. Bill has no moustache'. If there are no differences, the message is 'A perfect likeness'.

What can one learn from this? Obviously there is an opportunity to practise vocabulary, the words for parts of the face the comparative adjectives, the fact that you can say 'long hair' but not 'big hair'. But what is most important is the fact that this practice is not being presented as a language exercise, but is incidental to a memory problem. Learners may not even think of this as language practice but rather as a game. In that case they may learn more from it than they would from an ordinary exercise or translation task.

In order to squeeze the program into the space available on a 16k Spectrum, I have had to leave out all REMs and make use of



a number of space-saving tricks. The following notes will be of use to anyone who has the 48k memory available or who wants to adapt the listing for another machine.

Notes:

1) Design

Initialisation is at line 1000. This calls up the subroutine at line 180 to create a random face and display it. There are three possible sizes for each feature, yielding more than 19,600 possible faces. The program then resets all the face variables to 0, calls up the instruction panel and prepares the screen.

The main program loop begins at line 1110. A copy of the previous input word is put into e\$, and a new INPUT is made in d\$. The input word is scanned and matched either to a noun ('face', 'hair', etc) or to an adjective ('bigger', 'narrower', etc). If a noun is recognised (lines 1120 to 1190), then any previous drawing of the feature is erased, the size variable is set to the middle value, and the feature is drawn on the right of the screen. A variable h (for 'hold') is used to record which feature was last drawn.

If an adjective is recognised (lines 1200 to 1260), then a variable com is set to 1 or -1. There is a check to see whether that adjective can be used with the current feature (in h). If so, control passes to lines 2010-2090, where the current feature is erased, the value of com is added to the current size variable, with checks to make sure that the size limits are not exceeded, and then the feature is redrawn in the new size. The cases where an adjective cannot be used with a particular noun (such as 'longer eyes' or 'bigger hair') are picked up at line 1360. This displays the message 'I can't draw a rounder beard' or whatever, and then returns to input. Notice that the program is sensitive to the use of the indefinite article, 'a'. All the nouns which need 'a', namely nose, mouth, moustache and beard, are in the lower part of the face, whereas hair, eyebrows, eyes and ears do not need the article. This simplifies the Boolean condition for selecting it.

If the input word is 'help', a subroutine at line 700 is called up which lists the program's vocabulary down the left-hand side of the screen in such a way that it does not interfere with the working drawing. The word 'compare' signals the end of the game and passes control to line 1500. Unrecognised inputs are greeted with the message 'I don't know that word'.

The end-of-game sequence at line 1500 begins by comparing the face on the screen feature by feature with the original face of 'Bill Bolt' stored in array b(9). Each difference is printed out in the form 'Bill's face is wider', 'His eyes are smaller', etc. Notice how the program selects 'Bill' or 'Bill's' for the first difference, but 'He' or 'His' for subsequent differences. This is

done in the subroutines at lines 50 and 70 by PEEKing the cursor line. The selection of the right adjective in each comment is done by Boolean string assignment, something which is not available on all machines. Finally Bill's face is redrawn by using part of the original subroutine from line 200 (obviously leaving out the randomising statement at line 180).

The actual drawing routines are from lines 5010 to 5840. In each case the subroutine ending **10 erases the feature and the one at **30 redraws it in the new size. The face routine at line 5010 begins by wiping out any hair or ears that may have been drawn before, since the position of these depends on the size of the face.

2) Variables used in the listing

Drawing variables:

x for x-coordinate has values 32 (face on left) and 159 (on right)
y for y-coordinate has value 155 and is also used to identify line 155

Variables used as constants to save memory:

c = 12
z = 50
i = 1110

Other constants:

0 is replaced by NOT PI
1 is usually replaced by SGN PI
3 is replaced by INT PI

Counting variable is always j

Flag variable:

com has values -1 or 1, reset to 0 at each scan

Size and feature variables:

fa (face) has values	-5	0	5
ha (hair)	1	2	3
br (eyebrows)	1	2	3
ey (eyes)	1	2	3
ea (ears)	1	2	3
no (nose)	1	2	3
mo (mouth)	1	2	3
ms (moustache)	0	1	2
be (beard)	0	1	2
h (current feature)	10	. . .	90

Array:

b(9) holds randomly drawn features of Bill Bolt

String variables:

d\$ is current input
e\$ is previous input

3) PEEKs and POKEs:

POKE 23609 in line 20 lengthens the bleep tone when a key is pressed.
PEEK 23689 in lines 50 and 70 reads the cursor line.

John Higgins has taught English as a foreign language in six different countries since 1963. He took up computing in 1980, and has produced a number of programs for language learners, mainly in the form of simulations or reading aids.

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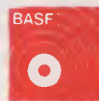
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10 REM Photofit @ John Higgins
1983
20 BORDER 2: PAPER 7: INK 1: C
LS : POKE 23609,70: LET c=12: GO
TO 1000
50 IF PEEK 23689=c THEN PRINT
"Bill's "; RETURN
60 PRINT "His "; RETURN
70 IF PEEK 23689=c THEN PRINT
"Bill "; RETURN
80 PRINT "He "; RETURN
155 PRINT "Press 'C' to continu
e.
"
160 IF INKEY$<>"c" THEN GO TO
160
165 RETURN
180 DIM b(9): FOR j=SGN PI TO 9
: LET b(j)=INT (RND*INT PI)+SGN
PI: NEXT j
200 LET x=32: LET y=155: LET fa
=5*SGN (b(1)-2): GO SUB 5030
220 LET ha=b(2): GO SUB 5130: L
ET br=b(INT PI): GO SUB 5230
250 LET ey=b(4): GO SUB 5330: L
ET ea=b(5): GO SUB 5430
270 LET no=b(6): GO SUB 5530: L
ET ms=b(7)-SGN PI: GO SUB 5630
290 LET mo=b(8): GO SUB 5730: L
ET be=b(9)-SGN PI: GO SUB 5830:
RETURN
500 PRINT AT NOT PI,c;"PHOTOFIT
";AT 16,NOT PI;"This is Bill Bol
t, the burglar. Study his face c
arefully.", "Later you must help
me draw it.": PRINT : GO SUB y
550 CLS : PRINT "Tell me which
part of the face", "to draw. Use
one of these words:"
560 PRINT : PRINT TAB 8;"face"
;TAB 20;"nose";TAB 8;"hair";TAB
20;"moustache"
570 PRINT TAB 8;"eyebrows";TAB
20;"mouth";TAB 8;"eyes";TAB 20;"
beard"
580 PRINT : PRINT "Then tell me
how to change the", "face. Use
one of these words:"
590 PRINT : PRINT TAB 4;"bigger
/ larger / longer";TAB 4;"thick
er / wider / rounder"
600 PRINT : PRINT TAB 4;"smalle
r / shorter / narrower";TAB 4;"t
hinner"
610 PRINT : PRINT "Type 'help'
to see the words", "again. Type
'compare' when the drawing is fi
nished.": GO SUB y: RETURN
700 PRINT AT NOT PI,NOT PI;"I u
nderstand.": PRINT : PRINT "face
hair": PRINT "eyes nose":
PRINT "mouth beard": PRINT "e
yebrows": PRINT "moustache": PRI
NT : PRINT "bigger larger"
710 PRINT "longer rounder": PR
INT "wider thicker": PRINT "sm
aller shorter": PRINT "thinner n
arrower": PRINT : PRINT "compare
help"
720 PRINT AT 18,NOT PI: GO SUB
y
740 PRINT AT NOT PI,NOT PI: FO
R j=SGN PI TO 18: PRINT "
": NEXT j: PRINT "(Type
'help' for word list.)": RETURN
1000 LET z=50: LET i=110: GO SU
B 180: GO SUB 500: LET x=159: LE
T ea=NOT PI: LET ms=NOT PI: LET fa
=NOT PI: LET br=NOT PI: LET fa
=-10: LET no=NOT PI: LET ey=NOT
PI: LET mo=NOT PI: LET ha=NOT PI
1100 CLS : BORDER 6: PRINT AT 1
8,NOT PI;"(Type 'help' for word
list.)": LET d$=""
1110 LET e$=d$: INPUT "Instructi
ons, please:",d$: LET d$=d$+"

```

```

1112 LET com=NOT PI: PRINT AT 16
,NOT PI;"
1115 PRINT AT 14,NOT PI;d$( TO 9
)
1120 IF d$( TO 4)="face" THEN G
O SUB 5010: LET fa=NOT PI: LET h
=10: GO SUB 5030: GO TO i
1130 IF d$( TO 4)="hair" THEN G
O SUB 5110: LET ha=2: LET h=20:
GO SUB 5130: GO TO i
1140 IF d$( TO 7)="eyebrow" THEN
GO SUB 5210: LET br=2: GO SUB
5230: LET h=30: GO TO i
1150 IF d$( TO 4)="eyes" THEN G
O SUB 5310: LET ey=2: GO SUB 533
0: LET h=40: GO TO i
1155 IF d$( TO 4)="ears" THEN G
O SUB 5410: LET h=z: LET ea=2: G
O SUB 5430: GO TO i
1160 IF d$( TO 4)="nose" THEN G
O SUB 5510: LET no=2: GO SUB 553
0: LET h=60: GO TO i
1170 IF d$( TO 9)="moustache" TH
EN GO SUB 5610: LET ms=1: GO SU
B 5630: LET h=70: GO TO i
1180 IF d$( TO 5)="mouth" THEN
GO SUB 5710: LET mo=2: GO SUB 57
30: LET h=80: GO TO i
1190 IF d$( TO 5)="beard" THEN
GO SUB 5810: LET be=1: GO SUB 58
30: LET h=90: GO TO i
1200 IF d$( TO 6)="bigger" OR d$
( TO 6)="larger" THEN LET com=S
GN PI: IF h<>20 THEN GO TO 2000
+h
1210 IF d$( TO 6)="longer" THEN
LET com=1: IF h<>10 AND h<>40 A
ND h<>70 THEN GO TO 2000+h
1220 IF d$( TO 7)="thicker" OR d
$( TO 5)="wider" THEN LET com=1
: IF h<>20 AND h<>40 THEN GO TO
2000+h
1230 IF d$( TO 7)="rounder" THEN
LET com=1: IF h=40 OR h=70 THE
N GO TO 2000+h
1240 IF d$( TO 7)="smaller" THEN
LET com=-SGN PI: IF h<>20 THEN
GO TO 2000+h
1250 IF d$( TO 7)="thinner" OR d
$( TO 8)="narrower" THEN LET co
m=-SGN PI: IF h<>20 THEN GO TO
2000+h
1260 IF d$( TO 7)="shorter" THEN
LET com=-SGN PI: IF h=20 OR h=
80 THEN GO TO 2000+h
1360 IF com<>0 THEN PRINT AT 16
,0;"I can't draw ";("a " AND h>
z);d$( TO 9);e$: GO TO i
1370 IF d$( TO 4)="help" THEN G
O SUB 700: GO TO i
1380 IF d$( TO 7)="compare" THEN
GO TO 1500
1390 PRINT AT 16,0;"I don't know
that word.": GO TO i
1500 BORDER 2: PRINT AT 14,NOT P
I;"
":AT 18,NOT PI;"
":AT c,NOT
PI: IF fa<5*SGN (b(1)-2) THEN
GO SUB z: PRINT "face is bigger
"
1510 IF fa>5*SGN (b(1)-2) THEN
GO SUB z: PRINT "face is smaller
"
1520 IF ha<>b(2) THEN GO SUB z:
PRINT "hair is ";("longer" AND
ha<b(2));("shorter" AND ha>b(2))
;".
"
1540 IF br<>b(3) THEN GO SUB z:
PRINT "eyebrows are ";("thicker
" AND br<b(INT PI));("thinner" A
ND br>b(INT PI));".
"
1560 IF ey<>b(4) THEN GO SUB z:
PRINT "eyes are ";("bigger" AND
ey<b(4));("smaller" AND ey>b(4)
);".
"
1580 IF ea<>b(5) THEN GO SUB z:

```

```

PRINT "ears are ";("bigger" AND
ea<b(5));("smaller" AND ea>b(5)
);".
"
1590 IF no<>b(6) THEN GO SUB z:
PRINT "nose is ";("wider" AND n
o<b(6));("narrower" AND no>b(6)
);".
"
1610 IF mo<>b(8) THEN GO SUB z:
PRINT "mouth is ";("bigger" AND
mo<b(8));("smaller" AND mo>b(8)
);".
"
1630 IF ms=NOT PI AND b(7)>SGN P
I THEN GO SUB 70: PRINT "has a
moustache.": GO TO 1660
1640 IF ms<(b(7)-SGN PI) THEN G
O SUB z: PRINT "moustache is big
ger.
"
1650 IF ms>NOT PI AND b(7)=SGN P
I THEN GO SUB 70: PRINT "has no
moustache.": GO TO 1660
1660 IF ms>b(7)-SGN PI THEN GO
SUB z: PRINT "moustache is small
er.
"
1670 IF be=NOT PI AND b(9)>SGN P
I THEN GO SUB 70: PRINT "has a
beard.": GO TO 1800
1680 IF be<b(9)-SGN PI THEN GO
SUB z: PRINT "beard is longer.
"
1690 IF be>NOT PI AND b(9)=SGN P
I THEN GO SUB 70: PRINT "has no
beard.": GO TO 1800
1700 IF be>b(9)-SGN PI THEN GO
SUB z: PRINT "beard is shorter.
"
1800 GO SUB 200
1810 IF PEEK 23689=c THEN PRINT
: PRINT : PRINT "A perfect like
ness.
"
1850 PRINT : PRINT : PRINT "Pres
s 'R' for another go.
"
1860 IF INKEY$="" THEN GO TO 18
60
1870 IF INKEY$="r" THEN RUN
1900 STOP
2010 GO SUB 5010: LET fa=5*com-5
*SGN com*(fa/5-com): GO SUB 503
0: GO TO i
2020 GO SUB 5110: LET ha=ha+com*
((ha<INT PI AND com=SGN PI) OR (
ha>SGN PI AND com=-SGN PI)): GO
SUB 5130: GO TO i
2030 GO SUB 5210: LET br=br+com*
((br<INT PI AND com=SGN PI) OR (
br>SGN PI AND com=-SGN PI)): GO
SUB 5230: GO TO i
2040 GO SUB 5310: LET ey=ey+com*
((ey<INT PI AND com=SGN PI) OR (
ey>SGN PI AND com=-SGN PI)): GO
SUB 5330: GO TO i
2050 GO SUB 5410: LET ea=ea+com*
((ea<INT PI AND com=SGN PI) OR (
ea>SGN PI AND com=-SGN PI)): GO
SUB 5430: GO TO i
2060 GO SUB 5510: LET no=no+com*
((no<INT PI AND com=SGN PI) OR (
no>SGN PI AND com=-SGN PI)): GO
SUB 5530: GO TO i
2070 GO SUB 5610: LET ms=ms+com*
((ms>NOT PI AND com=-SGN PI) OR
(ms<2 AND com=SGN PI)): GO SUB 5
630: GO TO i
2080 GO SUB 5710: LET mo=mo+com*
((mo<INT PI AND com=-SGN PI) OR
(mo>SGN PI AND com=-SGN PI)): GO
SUB 5730: GO TO i
2090 GO SUB 5810: LET be=be+com*
((be>NOT PI AND com=-SGN PI) OR
(be<2 AND com=SGN PI)): GO SUB 5
830: GO TO i
5010 GO SUB 5110: GO SUB 5410: P
LOT INVERSE 1;x-fa,y: DRAW INV
ERSE 1;20+fa,-z,SGN PI: DRAW IN
VERSE 1;20,NOT PI: DRAW INVERSE
1;20+fa,z,SGN PI: RETURN
5030 PLOT x-fa,y: DRAW 20+fa,-z,
SGN PI: DRAW 20,NOT PI: DRAW 20+
fa,z,SGN PI: RETURN
5110 FOR j=NOT PI TO 18: PLOT I
NVERSE 1;x-5,y+j: DRAW INVERSE

```

PHOTOFIT

```

1;75,0: NEXT j: RETURN
5130 PLOT x-fa,y: FOR j=NOT PI T
O (62+2*fa) STEP INT PI: DRAW 2,
6*SIN (j/(3*fa/5+20))*ha: PLOT x
-fa+j,y: NEXT j: RETURN
5210 FOR j=SGN PI TO 5: PLOT IN
VERSE 1;x+18-br,y-5-j: DRAW IN
VERSE 1;10+br*2,NOT PI: NEXT j
5215 FOR j=1 TO 5: PLOT INVERSE
1;x+36,y-5-j: DRAW INVERSE 1;1
0+br*2,NOT PI: NEXT j: RETURN
5230 FOR j=SGN PI TO 10+br*2: PL
OT x+18-br*2+j,y-9-SIN ((br-1)*j
): NEXT j
5240 FOR j=SGN PI TO 10+br*2: PL
OT x+36+j,y-9-SIN (j*(br-SGN PI)
): NEXT j: RETURN
5310 PLOT INVERSE 1;x+18,y-18:
DRAW INVERSE 1;10,NOT PI,ey: DR
AW INVERSE 1;-10,NOT PI,ey: PLO
T INVERSE 1;x+36,y-18: DRAW IN
VERSE 1;10,NOT PI,ey: DRAW INVE
RSE 1;-10,NOT PI,ey: RETURN
5330 PLOT x+23,y-18: PLOT x+41,y
-18: PLOT x+18,y-18: DRAW 10,NOT
PI,ey: DRAW -10,NOT PI,ey: PLOT
x+36,y-18: DRAW 10,NOT PI,ey: D
RAW -10,NOT PI,ey: RETURN
5410 IF ea=NOT PI THEN RETURN
5415 PLOT INVERSE 1;x-fa/2,142:
DRAW INVERSE 1;-ea*PI,NOT PI,P
I: DRAW INVERSE 1;ea*PI+fa/PI,-
c: DRAW INVERSE 1;ea,NOT PI: PL
OT INVERSE 1;x+60+fa/2,142: DRA
W INVERSE 1;ea*PI,NOT PI,-PI: D
RAW INVERSE 1;-ea*PI-fa/PI,-c:

```

```

DRAW INVERSE 1;-ea,NOT PI
5420 RETURN
5430 PLOT x-fa/2,142: DRAW -ea*P
I,NOT PI,PI: DRAW ea*PI+fa/PI,-c
: DRAW ea,NOT PI: PLOT x+60+fa/2
,142: DRAW ea*PI,NOT PI,-PI: DRA
W -ea*PI-fa/PI,-c: DRAW -ea,NOT
PI: RETURN
5510 PLOT INVERSE 1;x+32,y-22:
DRAW INVERSE 1;-2*no,-10: DRAW
INVERSE 1;4*no,NOT PI: DRAW IN
VERSE 1;-2*no,10: RETURN
5530 PLOT x+32,y-22: DRAW -2*no,
-10: DRAW 4*no,NOT PI: DRAW -2*n
o,10: RETURN
5610 FOR j=SGN PI TO ms+SGN PI:
PLOT INVERSE 1;x+24-ms,y-34-j:
DRAW INVERSE 1;16+ms*2,NOT PI:
NEXT j: RETURN
5630 IF ms=NOT PI THEN RETURN
5635 FOR j=SGN PI TO ms+SGN PI:
PLOT x+24-ms,y-34-j: DRAW 16+ms*
2,NOT PI: NEXT j: RETURN
5710 PLOT x+24,y-40: DRAW INVER
SE 1;16,NOT PI: DRAW INVERSE 1;
-16,NOT PI,-mo: RETURN
5730 PLOT x+24,y-40: DRAW 16,NOT
PI: DRAW -16,NOT PI,-mo: RETURN

5810 FOR j=SGN PI TO 6*be STEP b
e: PLOT x+31-6*be+j,y-z: DRAW I
NVERSE 1;NOT PI,-be*j: NEXT j
5815 FOR j=-6*be TO -SGN PI STEP
be: PLOT x+32+(6*be+j),y-z: DRA
W INVERSE 1;NOT PI,be*j: NEXT j
: RETURN
5830 IF be=NOT PI THEN RETURN
5835 FOR j=SGN PI TO 6*be STEP b
e: PLOT x+31-6*be+j,y-z: DRAW NO
T PI,-be*j: NEXT j
5840 FOR j=-6*be TO -SGN PI STEP

```

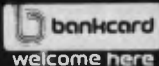
```

be: PLOT x+32+(6*be+j),y-z: DRA
W NOT PI,be*j: NEXT j: RETURN

```



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PRINTOUT

Continued from Page 19

the courage of our conviction to see it through.

Should another company wish to try and stop us again we will meet the challenge.

No longer will large conglomerates try and use their financial muscle to squash competition without being aware of the fact that a little guy could come out on top.

Michael Suss



The Australian Computer Equipment Suppliers Association today came out in strong support of the Government's commitment to undertake action as necessary to provide legal protection for computer software.

The Association is particularly grateful for the speed with which the Government has moved to alleviate the problem caused by the recent decision of the Federal Court on legal protection for computer software and would fully support any proposal by the Government to backdate legislation when introduced.

The Association pointed out that the present situation is extremely dangerous to the viability of the computer

industry in Australia and has the potential to damage other areas of industry where computers are an integral component in operations.

"Indeed, it is difficult to imagine a situation which would put our industry at greater risk," says the Association's Executive Director, Mr R C Mounic.

Today's announcement by the Government will remove the risk to the thousands of millions of dollars invested in computer software. Furthermore, the decision is of particular importance for small Australian companies who, in many cases, would lack the financial resources necessary to protect their intellectual property by legal and other means.

The co-operation and understanding received from both Government and Opposition leaders was outstanding, the Government officials also acted quickly and constructively in contributing to this highly satisfactory short term arrangement.

Excalibur 64

An Australian designed and

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Also Volume 0 — continuously updated catalog and (some) documentation — 1 disk. Many more not ready for advertising deadline . . . No Australian software available.

\$30 per disk !!!

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S.A.S.E. for detailed list.

Many volumes filled close to disk capacity, using reversible (floppy) disks. No "demo versions". Enough documentation on disk to get started plus details of books and manuals available.

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Please help by passing this software on. Unlike most, we hope retailers can offer these volumes at even lower prices — or better still, give them away.

We apologise for any temporary inconvenience to publishers, but suggest they should start applying for compensatory grants instead of trying to deprive the public of cheap software by pressing for changes in the law. Further explanation on disks.

PUBLIC DOMAIN SOFTWARE LIBRARY

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The two people pictured here sharing a glass of wine are George Parry of MicroEducational and Wendi Walters of Control Data Corporation. Apparently, they're celebrating a deal between their two companies to produce "house-brand" CDC disks for MicroEducational.

So if you ever see these disks around, you'll know where it all started.

manufactured micro has been announced by BGR Computers. It's called Excalibur 64. Its basic configuration includes 64k of RAM (of which 48k is available to the user), 16k of ROM (with Microsoft Basic) and Centronics and RS232C ports. The screen can be configured to a 40 x 24 or 80 x 24 format and for graphics, a resolution of 640 x 288 is standard. The disk based version runs CP/M 2.2.

BGR are at 431 St Kilda Road, Melbourne, 3004. Telephone: (03) 267 2147. The basic version sells for \$699.

Commodore software

South Pacific Software has

sent us its December '83 catalogue of "quality programs for business and leisure at affordable prices". It contains a large number of offerings for the VIC 20, Commodore 64, CBM 8000 and CBM 700 business micros. We haven't got any of this software onto the test bench yet (although we will) but below is just a sample of the catalogue.

Busi-Writer (for the '64) sells for \$75 but includes features such as mail merging, calculations (the results of which are included in the text), the ability to program the text editor to carry out up to 255 instructions automatically, and restoration of deleted text.

Also available are databases, personal finance programs, debtor, creditors and general ledger programs

for the '64. The VIC 20 business offerings are limited to spreadsheet and word-processing packages, while there is a large range of business software for the '8000 and 700 micros.

South Pacific Software is a division of The Micro-computer House and is at 116 Abercrombie Street, Chippendale, 2008. Telephone: (02) 698 7866.

New WP & accounting package from Archives

Archives Australia has released two new system packages, one dedicated to word processing and another designed specifically for business accounting. Both packages include the software and hardware likely to be needed by the buyer and both are selling for under \$5000 tax paid.

The word processing package is based around the

Morrow microcomputer, with a Freedom terminal (screen and keyboard), and a Brother daisy wheel printer.

"The package has been based on the most common needs of our users over the past 18 months," says Archives MD, Gower Smith.

The software includes WordStar word processing, and Correctit, a spelling checker, but one of the keys to the system is a utility called Smartkey, which allows all commands to be allocated to dedicated keys. The user may also reset the keys to include a whole string of commands for, say, the formatting of an often used report.

Other software packages included in the pack are Personal Pearl, a data base manager, Logicalc, a financial planner spreadsheet, three languages — Microsoft Basic 80, Basic, and Pilot an educational language.

The second system, the Archives PC Business Pack, which sells for \$4995 (inc. tax), has the Australian written Carpe accounting system with fully integrated stock inventory, debtors,

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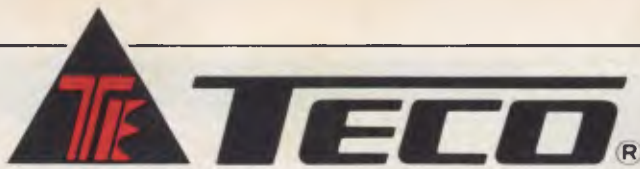


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The "Mouse", made famous by Apple's Lisa, has been made available for the Apple II. It is being packaged with "MousePaint" software that uses the mouse to design charts, diagrams, free-hand drawings and other visual aids for reports and presentations. Users can insert text in a drawing and can choose from a variety of character fonts and "fill patterns". MousePaint simulates bit map graphics on the Apple II.

Apple anticipates that most future Apple II software programs will offer the mouse as an option. An Apple III mouse is on the way.



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DEALER ENQUIRIES WELCOME

PRINTOUT

These packages became available from Archives dealers in all states from the first of February.

Archives are at 163 Clarendon Street, South Melbourne, 3205. Telephone: (03) 699 8377.

Select distributor appointed

The Software House has been appointed the exclusive Australian distributor for the Select wordprocessor and CP/M Teach software products from select Information Systems. Teach is a tutorial program to take a user "through all the Select wordprocessing functions and commands, giving

examples and tests at all stages. The package, which also includes a "Superspell" dictionary and a mailing list "Merge" facility retails for \$650 including tax. It's available for a range of micros including the IBM PC and PC XT, DEC VT 180, Toshiba T100 and NEC APC.

The Software House is on (03) 459 7877 and are at 80 Mount Street, Heidelberg.

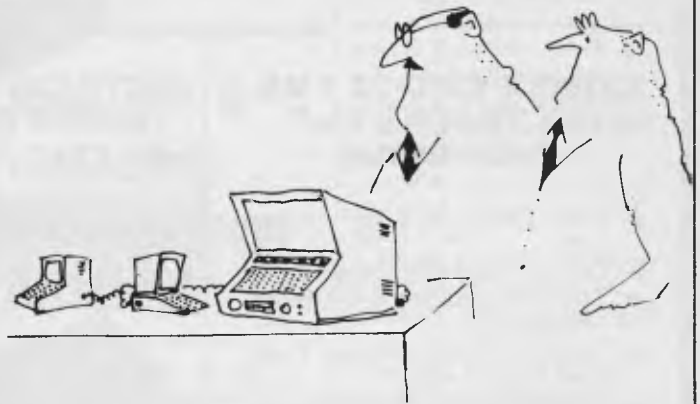
"Total teaching" for retarded

Prisoners working in the Pentridge Computer Industry will be involved in the programming of software designed to aid the mentally handicapped. Isis Computer

Systems has joined forces with the Department of Community Welfare Services (who have approved the prisoners' involvement) to produce "a total teaching system" which will "not, like other attempts around the world, focus attention on one or two elements", according to Joe Marijancevic, MD of

ISIS and project designer.

The "Cooinda" Retarded Children's Centre project will be designed to teach basic literacy and numeracy skills within a social context, to teach general social skills to keep track of performance and allow for the introduction of individualised curricula.



'It came from the Invitro Fertilization Department.'

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Black Hole Disaster. Does the "Black Hole" exist? You better believe it... and you're being pulled towards it! Only your aim can save you. **3K**

Clowneries. Help the clowns burst the balloons by bouncing them on the see-saw. The clowns go higher every time. **8/16K.**

Dangers of the Deep. You're out for a nice dip on a Sunday afternoon. Then suddenly they come from everywhere — sharks and octopi. They're all out to get you! Will you survive? **3K**

Drunken Driver. Guide the intoxicated driver through traffic avoiding the obstacles, pink elephants and police helicopter. **3K**

Escape. Your star ship is caught in a deadly meteorite shower. Escape by exploding the drifting meteors before you are destroyed. Hyperwarp through space to bring your crew safely home. **3K.**

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Election Campaign. For up to 4 players. Lead the party of your choice, tour the electorates making deals and buying votes (just like the real thing). Surprisingly exciting. **64.**

Motor Magnate. For 2 to 20 players. Become a tycoon, acquire parts, make takeovers, form syndicates (and go bankrupt?). Any resemblance between this UK-made game and British Leyland is purely coincidental. **64.**

Bank Manager. Discover the exciting life your local bank manager really lives. **Vic + 3K, 64.**

Evil Ghost Train. This train is bound for glory... or are you? There are passengers aboard with you... they've been on this run many times before. They're coming from every angle... ghosts, evil spirits, monsters and demons! Now, it's you or them. **3K.**

Explorer. As captain of a star ship, it is your mission to seek out new people and planets. You will go where no person has ever gone before. Adventure and danger are your constant companions. **16K.**

Labyrinth. Find your way through the underground maze. A mathematical-three-dimensional puzzle game. **3/8/16K.**

Moonlanding. You are landing on the moon for exploration. Suddenly you are attacked by Zirkons. Will you be destroyed? **16K.**

1984 Releases usually \$29.50 and up values, only **\$16** each.

The Christmas close-down meant our warehouse couldn't get the pretty colored packages for these printed in time. They're 1984's new releases retailing from \$29.50 upwards. (Our usual Discount Prices would be from \$25 upwards.) There's only about 100 of each title at this price, so get your order in early. Unless shown otherwise, they're for both CBM64 and Unexpanded Vic 20.

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Olympic Champion. You're representing your country in the Olympic Equestrian event. Take your trusty steed through the speed, jumping and cross country competition to take home the coveted gold. **3K.**

Othello. Master all your skill and concentration and try to beat the computer. **3K.**

Horseracing. Race your mighty steed in the sport of kings. Come home a winner or suffer the agony of defeat! **3K**

Exp' Joystick. **Raid on New York.** Bomb the city of New York to provide a landing strip on which to land, repair and refly your bomber. **8/16K.**

Rabbit. Cross the highway and canal avoiding the hazards. **8/16K.**

Road Demon. You are one of California's finest — a highway patrolman, "CHIPS". Apprehend the highway menace before he becomes another statistic, or makes you one!

Shooting Gallery. Run up points as you shoot the birds and animals. Hit the numbers to earn extra bullets. Careful, watch the clock. **3K.**

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They Come From Space. The year is 2020 and you're on space patrol. Suddenly, you are attacked by alien invaders!!

Adventure Trek. Cross the burning desert, enter the dangerous forest, traverse raging torrents. Dangers lurk along the way. **3K.**

Bombs Away. You are commander of an aircraft. Can you avoid the missiles and flatten the alien city defenses? **Downhill Racer.** The gold medal is on the line. The course is icy and dangers are everywhere. One mistake and you're out of it. Will you have the winning time?

Intruder. They come from outer space, strange creatures threatening our planet. Who are they? What do they want? No time for questions now, only action will save you from the intruders. **3K.**

Mare Attack. You are counterattacking Mars in your star ship. Destroy the fortion fireballs before they explode and destroy you.

Nuclear Attack. Nuclear war has been declared and you have been designated to destroy with your missiles the enemy silos. You have 30 rockets and 6 silos to destroy. Good luck!

Dem Busters. Navigate bombers and helicopters behind enemy lines on a top secret mission to destroy a major dam. **Joystick/Keyboard.**

AUSTRALIA'S BIGGEST RANGE OF DISCOUNT SOFTWARE

Kaypro computing

David Guest explores the intricacies of a 'portable' business micro with a hard disk.

Once there was a man called Adam Osborne who made an enviable fortune by producing an unassuming micro that could be carried around.

In the fullness of time others saw the possibility of following in his footsteps (which left a deep imprint, owing to the weight of his machine), and a number of 'portable' micros appeared. One such was the Kaypro II, built by Non-Linear Systems (NLS), whose previous claim to fame has been a digital voltmeter.

Mr Osborne observed the Kaypro and declared it to be a flash in the pan.

And just as the Osborne Computer Corporation sought refuge from its clamouring creditors in the US bankruptcy laws, the Kaypro 10 arrived in Australia looking hale and hearty and unassuming except for its 10Mb Winchester disk. Nobody who carries this system about should ever have sand kicked in their face again.

In some respects NLS has borrowed from Osborne (transportability, conservative technology, bundled business software) and in others it has gone one better. The hard disk is the most obvious example and for the moment is what marks the Kaypro 10 out from all its competitors.

Presentation

The 10 arrives in a Russian doll arrangement of cardboard boxes; the large outer box opens to reveal a smaller one of uncomplicated construction. The smaller box contains the machine itself, sheathed in a plastic bag, and the documentation which is unaccountably sheathed in two plastic bags.

Documentation

NLS gives away various items of business software with the 10 in addition to three Basics and CP/M 2.2. This makes for a substantial amount of documentation; if you're planning to carry the machine anywhere you might like to work out on the manuals first.



Work out on the documentation first.

The main users guide is a pleasantly produced ring-binder that shouldn't give offence to the initiated or discourage the novice. To judge by its illustrations, NLS expects most users of the Kaypro 10 to be young women with frightening finger nails.

The system now comes with a swag of software: the Perfect range of software. Wordstar, Suprterm and Microplan in addition to MBasic, CBasic, SBasic, CP/M and Word Plus.

Construction

As befits the product of a digital voltmeter manufacturer the Kaypro 10 has a steely, angular solidity when closed. The Kaypro logo and some racy stripes relieve the greyness of the box, but the main concession to style doesn't appear until you unclip the keyboard from where it sits flush with the screen. In use the 10 is a very good looking machine; its casing forms a hood above the screen, giving it a strangely malevolent air.

The keyboard is a separate unit and it forms the base when the system is in transportation mode. The backplane has the carrying handle, ports and switches, and also four protrubances that might, given the duplication in the packaging, serve as back-up feet but are more likely to be a provision for rack-mounting.

The box measures 46cm by 38cm by 20cm, and the whole package weighs 14kg. It has yet more feet which serve the main unit in use and a hinged metal

stand that tilts it to an angle for the user. This reviewer, no giant by any means, found the angle too shallow.

Keyboard

Linked to the machine by a cord when in use, and by two clips in transit, the keyboard unit might be the crowning glory of this system if it weren't for the fact that it is its base.

There's nothing special about the layout of the keys themselves, and they may offer too little resistance to appeal to all tastes, but the banked effect of the higher rows makes this an exceptional keyboard to use.

The separate numeric keypad is not sculpted to the same extent but its 14 keys have the distinction of being programmable. The four cursor control keys that surmount the main body of keys (another 62 in all) are also programmable.

The reset button, thoughtfully provided in red plastic, is well away from wayward fingers at the back of the machine.

Screen

Anybody who has ever peered doggedly at the original Osborne screen for any length of time will appreciate the Kaypro 10's 9in display. There is still a strong temptation to lean into it and at times you feel as though you're looking through the wrong end of a telescope but that has more to do with the size of the fascia than the size of the screen.

It is green on black, 24 lines (plus a status line) of 80 characters, and has inverse video, blinking, underlining, and reduced intensity — unspectacular but functional.

The screen's most endearing feature is its pronounced persistence. The ghosts of characters linger on the screen as though they can't believe that the last refresh cycle has gone. Large graphics constructions disappear with particular reluctance.

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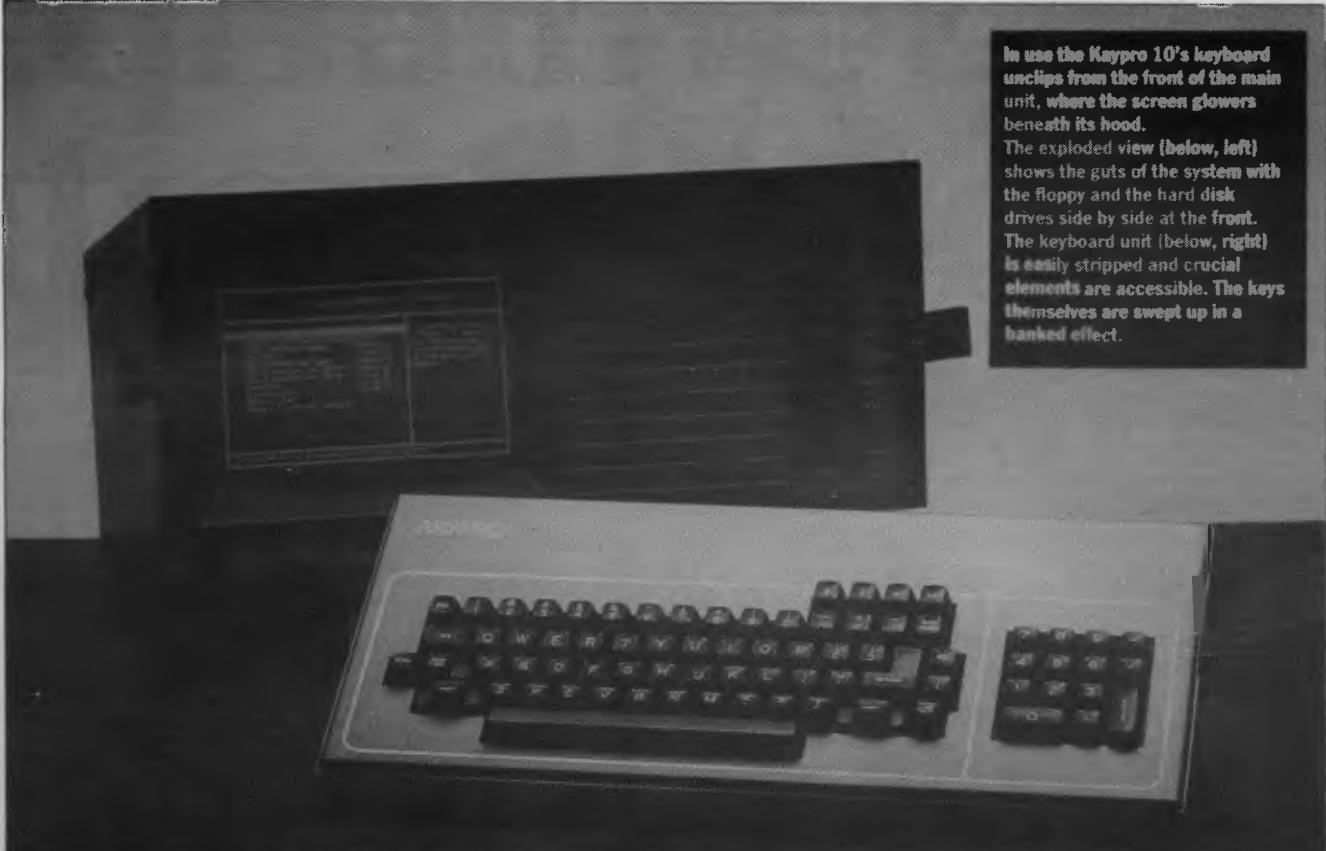
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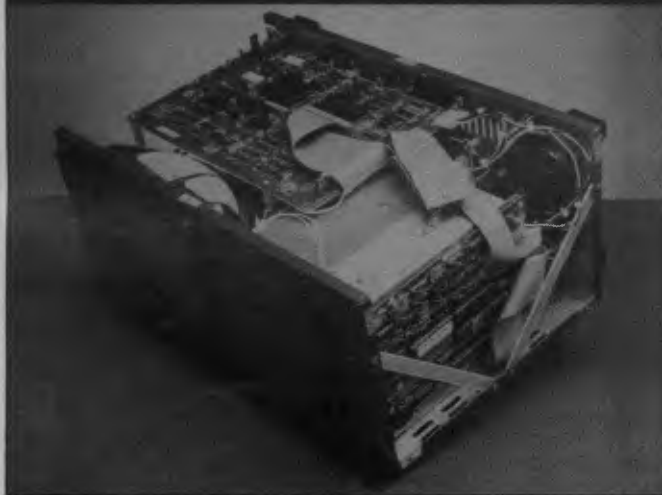
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In use the Kaypro 10's keyboard unclips from the front of the main unit, where the screen glowers beneath its hood.

The exploded view (below, left) shows the guts of the system with the floppy and the hard disk drives side by side at the front. The keyboard unit (below, right) is easily stripped and crucial elements are accessible. The keys themselves are swept up in a banked effect.



As a business graphics system the 10's screen is 100 by 160 pixels. But the manual won't fill you with confidence: 'The Kaypro 10 has graphics capability. However it needs a program to tell it what to do . . . If you are not able to write the programs and you want to use the Kaypro 10 graphics capability for business or other purposes, then (Note the if . . . then) it is best to find someone to write a program to do what you want.'

Storage

With a Z80A doing the pushing the 10 has 64k of RAM and just 4k of ROM.

Then there's the small matter of a 10Mb Winchester disk. Is this overkill? A sledgehammer to crack a nut? Perhaps there will prove to be an equivalent to Parkinson's Law that will say that data expands to fill the space available to it. 'Equivalent to 50 floppies!' Kaypro exclaims in its brochure, and that sounds like an awful lot of backing up. But the system keeps a sense of proportion by treating the hard disk as two drives, each divided into 16 user areas.

The 10 has a 5.25in floppy disk drive for back-up purposes. It takes single or double-sided, double-density disks, and Kaypro II users will be able to carry over data or programs to the larger system.

There is a maximum of 390k on the floppy front.

The system generally is very responsive; saving and loading files are impressively fast operations. It may be that the most enduring reservation about the value of hard disks on portable machines will concern their resilience. But if you accept that a 14kg machine is not likely to be going walkabout very often it could be a minor reservation.

Expansion

Strictly speaking The Kaypro 10 has connections rather than expansion

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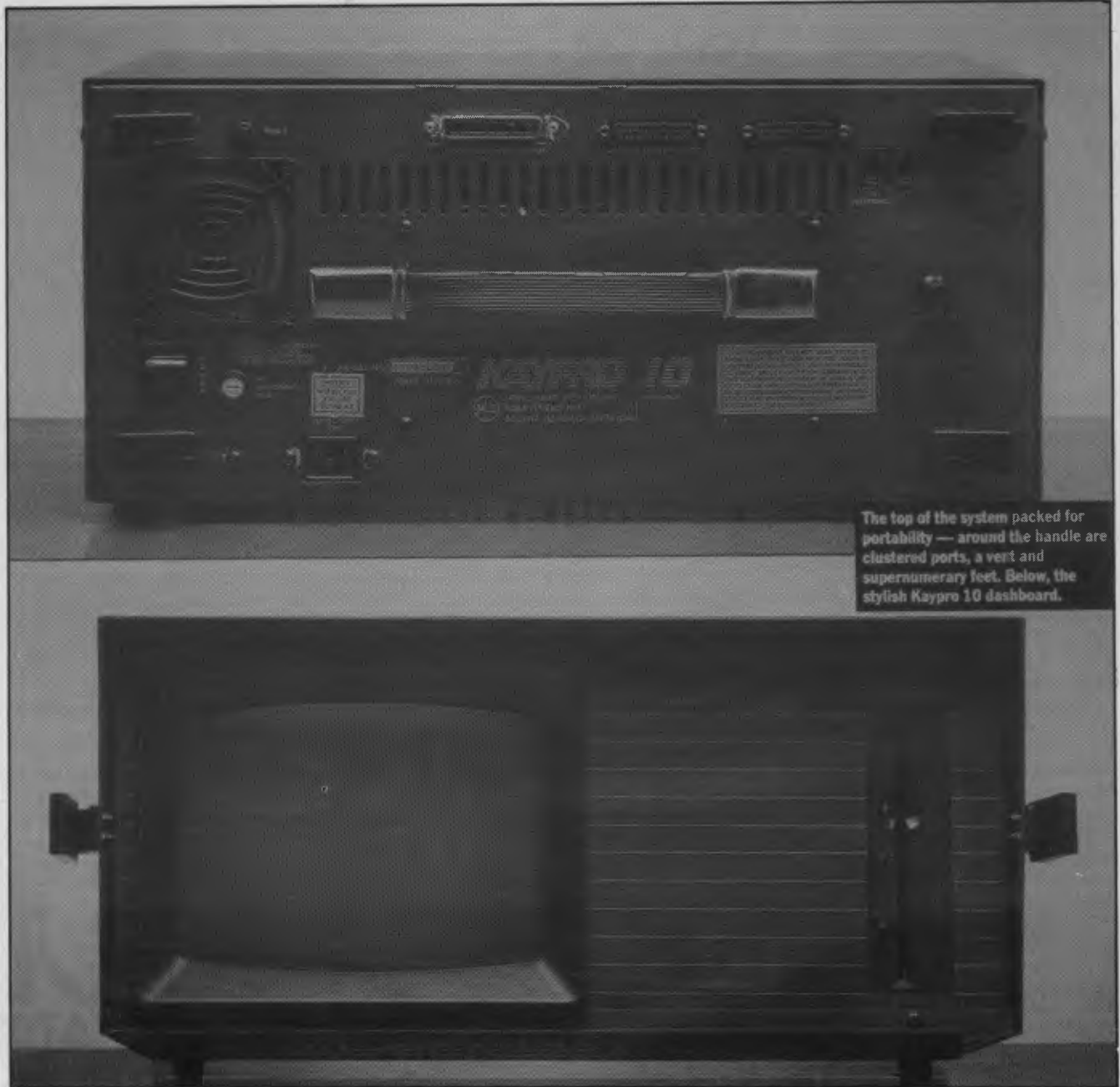
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UPMARKET AND HIGH SPEED PRINTERS



The top of the system packed for portability — around the handle are clustered ports, a vent and supernumerary feet. Below, the stylish Kaypro 10 dashboard.

potential. The three ports at the back give it a Centronics interface, a serial printer interface, and one to attach a modem.

The modem port is intended to be used among other things with the Superterm software supplied by NLS. This was designed for the Kaypro line of machines and in one of its manifestations it can turn the 10 into a terminal tied into the Dow Jones system (or so we are assured).

Software

It isn't necessary to say very much about MBasic, CBasic, SBasic, Old Uncle Tom Basic etc except that this surely is going over the top. One programming language

available in three versions (four if you count OBasic, and why not? The more the merrier)? It seems contradictory to say the least.

NLS, at great cost to its profit margins no doubt, is supplying a range of business applications to make life easy for the untutored business user, and it throws in several Basics which will never see the light of day if the Perfect range does the job.

Supplied with Wordstar and Microplan, this spreadsheet was so friendly that it was loath to let the reviewer go.

There's also a set of games in the package; these lack polish and demonstrate a juvenile sense of humour that American programmers would be well-advised to disguise. But the Kaypro

10 is a business system; perhaps the games were intended to be trivial.

NLS has provided a hierarchy of menus and it isn't difficult to find your way around the system. It is noticeable, though, that it is much easier to move down from the master menu than to return to it as some of the return paths are oddly tortuous.

Verdict

Who was it who said that of all human failings prophecy is the most gratuitous? If the Kaypro 10 succeeds, Adam Osborne may have to eat his words.

On the face of it the 10 certainly should succeed — at the price quoted it looks

almost extravagantly generous. Most of the hardware elements are well tried and tested, and the same goes for the systems and applications software. CP/M and a Z80 may give it a dated air but most users are fairly pragmatic as 32-bit chips and Unix sound good, but what is needed is something that works — and works now.

Any reservations about the reliability of a portable system that includes a Winchester disk, which we've been warned for years are notoriously sensitive, should be considered in context. First, you probably won't be carrying the machine around very much. Second, the power-down procedure includes a routine that tucks the disk up in bed as far as possible. Third, any disk drive can fail at any moment, with or without being dropped from a great height.

Back-up will be a chore, granted. But to compensate for that there is the eye-opening and almost incredible luxury of having all the software, data files and programs alike, in one place. A Z80

driving a 10 megabyte hard disk may be like kick-starting a jumbo but it does leave you in control of a mobile jumbo.

Computer people are very fond of talking about what they call a learning curve. The Kaypro 10 will introduce you to a variation, the indolence curve. This is how it works: you start your micro-computing career with something that loads software from a cassette — this is slow, tedious, and unreliable. Later, for an outlay of some hundreds of dollars, you graduate to a system with floppy disks — these are faster, more reliable, and for a time the last word in data storage. Eventually you may encounter a hard disk system and you'll feel almost self-indulgent using it. It will rob you of all desire to shuffle floppies ever again.

The next step may be foreshadowed in Shugart's announcement of a 1Gb optical disk (for \$7,000) recently. An outrageous prospect? The Kaypro 10 would have seemed so a couple of years ago.

Specification

Price	\$6215 including tax
Processor	Zilog Z80A
RAM memory	64k
ROM memory	4k
Text screen	80 x 25
Graphics screen	160 x 100 pixels
Keyboard	76-key full-travel detachable, numeric keypad, 14 programmable
Interfaces	Two RS232, one Centronics
Storage	10Mb Winchester disk, 5.25in floppy up to 390k
OS	CP/M 2.2
Languages Software	MBasic, CBasic, SBasic, OBasic A choice of word processing, spreadsheet, spelling checker packages to be determined; Word Plus, Superterm; games
Manufacturer	Non-Linear Systems Inc, Solana Beach, California.

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BIBLIOFILE

Once again Steve Withers has been weaving his way through the maze of computer books available.



Learn Pascal on your Basic Micro

One of the disadvantages of the cheaper home computers is that programming in a language other than Basic is only possible after spending a fair sum of money. If you are lucky, you will be able to buy an extra ROM (e.g. FORTH for the BBC micro for \$70 or so), or maybe you can get something from the public domain (like COMAL for most of the Commodore range). Otherwise you may need to upgrade to a disk system before you can make use of languages like C or Pascal which are normally compiled.

Jeremy Ruston has provided an answer to this problem by designing and implementing a program which allows the use of a subset of Pascal on a machine equipped with a Basic interpreter. Ruston introduces his program as a pseudo-compiler, but subsequently refers to it simply as a compiler. It is in fact a translator as it converts the Pascal program into its Basic equivalent.

Three versions of the compiler are presented: one for the Sinclair ZX Spectrum, one for the BBC micro, and one in "no frills" Microsoft Basic.

Regardless of the machine, the Pascal source code is entered as a series of DATA statements, and the compiler sends the Basic version to the screen. The user is then expected to type the Basic back into the computer in order to run the program, unless he/she is fortunate enough to have a BBC micro, as that machine allows screen output to be diverted to tape in a form that can be read as a program. Other versions of the compiler could be modified to get round the restriction, but since this would be machine-dependent it is left to the user as an exercise.

The compiler does not support a particularly large subset of Pascal. Data types are restricted to integer, real, boolean, and char (i.e. no user-defined types, sets, or records), and there is no provision for procedures or functions. This is quite restrictive, since these are the features that set Pascal apart from Basic. To keep things in perspective, no-one is likely to use the compiler for 'real' programs, but it would be useful for the beginner who wishes to do more than just read about the language. As the author writes: "if you find you don't like programming in Pascal, you will not have to pay a large sum of money for a

Pascal compiler for the privilege of finding out".

The listings of the compiler fill the second half of the book. The first part is a tutorial on the language itself, and is sensibly divided into two sections, the first covering those parts of the language which are supported by the compiler. The reader soon gets an idea of the appearance of a Pascal program, and the various features are gradually introduced. While there are few direct comparisons made, the presentation of the material is clearly aimed at those who have a working knowledge of Basic. The coverage of the language is incomplete, particularly in respect of data structures. Since these are central to the philosophy behind Pascal, this is a serious omission.

I feel that the book is fine so far as it goes, but it doesn't quite manage to get the full flavour of Pascal across to the reader.

Learn Pascal on your Basic Micro.

Author: Jeremy Ruston.

Publisher: Interface, London (available through Pitman, Melbourne, Sydney, and Brisbane).

Price: \$18.95.

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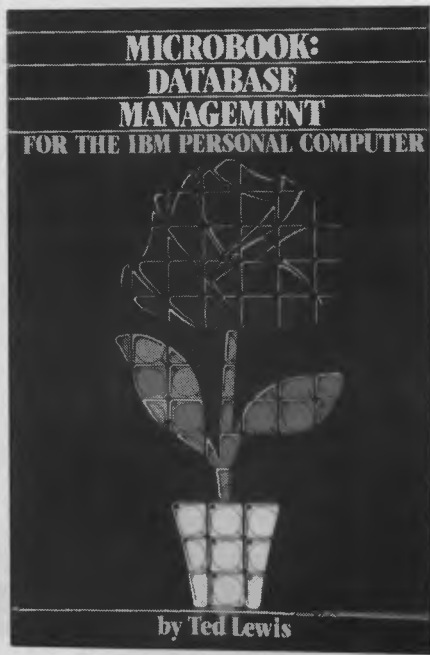
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Microbook

Another "book of the program", but of a different nature to the first. The Microbook program is a database manager written in UCSD Pascal (for the IBM PC, but it looks like it should work on other 16 bit machines with 128k of RAM and the p-System). Why the name Microbook? The system uses a conventional book as a metaphor for a database. A specific database is a "book", individual records are "pages", and collections of similar pages are "chapters". There is also a dictionary, as well as one or more indexes.

Microbook is essentially the Users Manual for the program. It contains very little information about database systems in general, or about the functioning of the Microbook program. This means that it will be of interest only to those who wish to use the software. As such manuals go, it is pretty good. It is written in a straight forward style, with frequent examples including photographs of the appropriate displays.

Anyone who buys the book with the intention of keying-in the program is in for a lot of work. There are 67 pages of source code that have been reduced to half size (i.e. 20 characters per inch, 12 lines per inch), so one could easily end up with sore eyes as well as sore fingers. But fear not — dilithium Press comes to the rescue with the offer of a pair of program disks for a mere \$US15.95. Not only that, but they will replace damaged or destroyed disks for \$US5. The strange part of the deal is that they also sell two other disks containing the source code, but they cost \$US49.95. While dilithium deserve praise for the low cost of the

program disks, how do they justify charging so much more for the source when it is already in the book? I think many people would want the source code, as this would allow them to extend the program to provide more facilities — there are some improvements suggested in the book.

It seems to me that Microbook will not appeal to a very wide market, but those

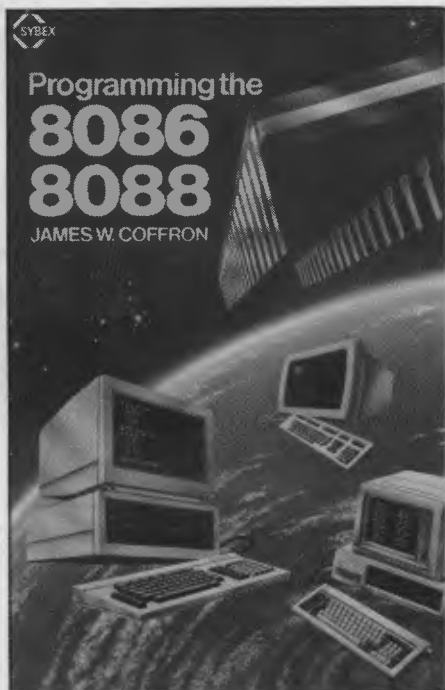
who can make use of the program will get good value for their money.

Microbook: Database Management for the IBM Personal Computer

Author: Ted Lewis

Publisher: dilithium Press, Beaverton OR, USA

Price: \$A33.95 (from ANZ Book Co., Sydney).



Programming the 8086/8088

As with so many things in life, it is

possible to place books on programming a particular processor into one of two categories: those that assume that you already know something about programming in assembly language, and those that don't. I would place "Programming the 8086/8088" in the first category, even though it does make a token effort to describe the fundamentals. Most people realise that going from a high-level language to assembler is a big step, but what surprised me was that my experience with Z80 and 6502 processors didn't help all that much when I encountered the 8086 with its segments and other arcane features. I found what I needed was a book that took time to develop the concepts and thus my understanding of the processor. Morgan and Waite's "8086/8088 16-Bit Microprocessor Primer" did that job, but as I started to write 8086 programs, I realised that it wasn't much good as a reference book.

That is where Coffron's book comes in. "Programming the 8066/8088" is great if you can't remember which flags are affected by the MUL instruction, or whether it's STI or CLI that enables interrupts. The largest chapter in the book covers the instruction set, one



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instruction to a page, with the mnemonic shown in the top outside corner for easy reference. There are descriptions of each instruction, their effects on flags, programming examples, and the binary representation of the opcode. I'm not sure that the last item is going to be of use to many people: does anyone hand-assemble 8086 programs in binary?

Later chapters are a mixed bag. The section on "basic programming techniques" only covers arithmetic and subroutines — I know you must start somewhere, but is that really what assembly language programming is about? Although the chapter covering interrupts seems better, it could leave a reader wondering what is the *point* of a software interrupt. There are a couple of sample programs intended for the IBM PC: one prints the contents of a buffer,

while the other reads characters from the keyboard and sends them out through the RS232 port. Neither sounds particularly interesting, but once you understand them, there are several ways in which they can be modified as your understanding grows. How about printing each character twice? Converting lower case to upper case? Sending a carriage return/line feed after 40 characters have been printed on the same line? Sending each character to the screen as well as the printer or RS-232 port?

One thing about the book that I found very annoying was that the index is not inside the back cover. The last few pages are taken up by a list of other books published by Sybex, so you must search for the index before you can use it. This practice is too common for my liking, and I was tempted to cut out the offending

pages before I ripped them out in anger.

If I were only allowed one book on the 8088, this wouldn't be it — I don't think it is sufficiently comprehensive. For example, the 8087 coprocessor is becoming an increasingly common addition to personal computers, but Coffron hardly mentions it. However, I must admit that I can't tell you which book I would choose. Despite my criticisms, this book has found a place in my library.

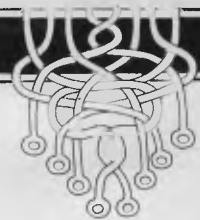
Programming the 8086/8088

Author: James W. Coffron

Publisher: Sybex Inc, Berkeley CA, USA

Price: \$A25.50 (from ANZ Book Co., Sydney).

LAZING AROUND



by J J Clessa

Quickie

I know a little girl whose father is older than her grandfather. How can this be?

Prize Puzzle

In Dutch cricket there are two possible ways of scoring — a field goal or a penalty — each being worth a different number of points.

There are 24 different scores which are impossible to achieve in this game (18 is one of them). What are the points values of field goals and penalties?

Answers please — postcards or backs of envelopes only — to reach APC by 15

February, 1984. Send your entries to: January Prize Puzzle, APC, P.O. Box 298, Clayton, Vic 3168.

October Prize Puzzle

Although there were many possible solutions to this problem, quite a large percentage of the 60 or so entries got it wrong. Several people misunderstood the problem and came up with negative solutions. One entry consisted of a gigantic postcard with a computer printout stuck to it, showing 1152

arrangements giving the maximum score of 58, and 32 arrangements giving the minimum score of 40. (In fact this same entry appeared several times in the bag, in varying sizes.)

Anyway, we didn't check the 1184 arrangements, so we don't know if there are that many, but we did select a winner with the following solutions:

2 6 3		9 8 7
7 1 8	and	6 5 4
4 9 5		3 2 1

giving a maximum score of 58 and minimum of 40.

The entry came from Mr Bob Hammond who receives our congratulations and the usual prize.

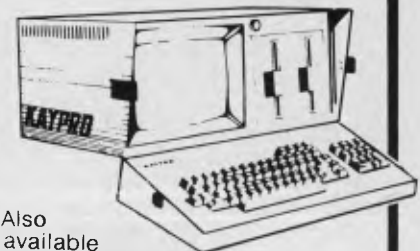
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John Noad devises a method of hopping around programs and baffling inquisitive intruders.

Have you ever thought about security? You've probably considered ways of locking your programs, or putting the odd mug-trap in. But instead of making them difficult to break into, who not just make it practically impossible for unauthorised eyes to understand what's going on in them? Well it can be done, and there are other advantages.

At the risk of teaching you to suck eggs, I want to start with a brief description of what I call the 'Line Header Blocks' used by the Apple when storing Basic programs.

If you've ever delved into the make-up of a Basic program, as stored in RAM, then you will know that each line of a program has its own 'header block' which is four bytes long:

BYTE 1 carries the low byte of the starting address of the next header block

BYTE 2 carries the high byte of same

BYTE 3 carries the low byte of the number of the current line

BYTE 4 carries the high byte of same

So whenever a GOSUB or GOTO command is processed in a program the computer must search through every header block, starting from the beginning of the program (pointed to by TEXTTAB at \$67 and \$68) until it finds one with the target line number in bytes 3 and 4. It is able to do this fairly quickly because it can jump directly from block to block using the information in bytes 1 and 2.

I've already mentioned the use of one pair of zero page locations — at \$67 and \$68. Now I want to introduce an even more delightful couple who reside at \$B8 and \$B9, known to the Apple as TXTPTR.

Even if you know nothing about how a computer works it will be obvious that it must be keeping track of its whereabouts at any given point during the RUNNING of a program. In fact it does this in the Apple by constantly updating the contents of \$B8 and \$B9, which hold the address of each byte in the program as it is fed to the interpreter. But, and this is

```

$0300:A5 B8 LDA $B8 ;Store
TXTPTR low byte at $08

$0302:85 08 STA $08 ;(becomes
RETURN address low byte for second
CALL)

$0304:A5 B9 LDA $B9 ;Store
TXTPTR high byte at $09

$0306:85 09 STA $09 ;(becomes
RETURN address high byte for second
CALL)

$0308:A5 06 LDA $06 ;Transfer
POKEd target address low byte

$030A:85 B8 STA $B8 ;to TXTPTR
low byte

$030C:A5 07 LDA $07 ;Transfer
POKEd target address high byte

$030E:85 B9 STA $B9 ;to TXTPTR
high byte

$0310:A5 08 LDA $08 ;Store old
TXTPTR low byte at $06

$0312:85 06 STA $06 ;for RETURN
if wanted

$0314:A5 09 LDA $09 ;Store old
TXTPTR high byte at $07

$0316:85 07 STA $07 ;for RETURN
if wanted

$0318:60 RTS ;Return to
BASIC

```

Superskip GOs To places other programs cannot reach.

the important bit, the computer doesn't care what addresses TXTPTR checks out as long as the interpreter keeps receiving valid information. Thus it is theoretically possible to fill \$B8 and \$B9 with any pair of numbers you like as long as you meet that last condition.

Perhaps because I don't use much machine code on my own programs, it was some time before I realised that if Applesoft was inactive, then TXTPTR would remain static and could be changed at will. Obviously all I had to do was to CALL a machine code routine to do the job for me.

The point is that machine code routines don't need a program point as they don't use the interpreter. So when Basic executes a CALL the contents of TXTPTR will be preserved until an RTS returns program control to Applesoft and TXTPTR goes back to work.

In order to work it's way through a Basic program the interpreter uses a routine called CHRGET, which reads the byte pointed to by TXTPTR, feeds it to the interpreter, and then increments TXTPTR for a new byte — unless CHRGET collects a 0 (End of Line byte) or a : (End of Statement byte). In either of the latter cases (assuming that the 0 or : is not inside inverted commas), CHRGET halts while the last statement is executed. This means that when a machine code routine is CALLED, TXTPTR is left pointing at the zero or colon following the CALL.

So what happens when the machine code routine ends — when it reaches RTS? Well it seems (from my experiments) that TXTPTR is first incremented and then CHRGET goes back to work. In other words, when you alter TXTPTR it must point to the byte *preceeding* the statement you are jumping to, though it can safely 'return' to the byte it was sent from.

Superskip uses three commands — two POKEs and a CALL. If you want to unskip — the equivalent of RETURNing from a GOSUB — then only the CALL is needed. In both cases the same location — 768 — is CALLED (unless you wish to relocate the routine). What the routine does is to move four pieces of information around like this:
 Stage 1 the current value in the low byte of TXTPTR is moved to \$08, and the high

byte to \$09
 Stage2 the values that you POKEd into \$06 (low byte) and \$07 (high byte) are transferred to TXTPTR so that it now points at the target statement
 Stage 3 the old values of TXTPTR are moved down from \$08 and \$09 to allow a RETURN if it is wanted.

In Basic terms, we would have written GOSUB or GOTO (or THEN) we must now write POKE 6, (target address low byte) : POKE 7, (target address high byte) : CALL 768. Where we would have written RETURN we now write CALL 768 only. And where no RETURN is required then, as in Basic, we write nothing at all.

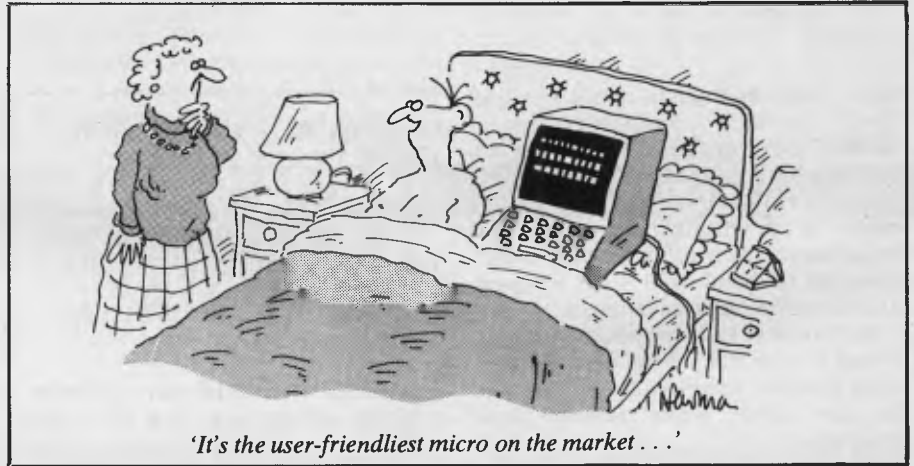
I've boiled Superskip down to 5 steps:

- (1) Enter the entire program as normal with all GOSUB/GOTO/THEN statements in place (making sure that they are not nested) and get a listing. It might be easier to use Superskip if all subroutines are collected at the end of the program, but it certainly isn't essential.
- (2) Working through from the start of the program replace each GOSUB/GOTO/THEN with POKE 6,000 : POKE 7,00 : CALL 768. Replace each RETURN with CALL 768.
- (3) Working through the target statements in the order in which they are

accessed replace the target statement with PRINT PEEK (184) and RUN the line. Now deduct 8 from the result and place the result in the appropriate POKE 6,000 statement (leading zeros will be ignored when the POKE is executed). Go to step (4) before repeating step (3). Note: What you are doing here is reading the low byte of TXTPTR. Deducting 8 takes you back to the byte before PRINT.
 (4) Repeat step (3), but this time alter PEEK(184) to PEEK (185). Unless your program is very long (more than 23,000 bytes) the result of this PEEK is unlikely

to be more than two digits. The result of PEEK(185) will give you the high byte of TXTPTR. However, if the result of step (3) was 7 or less then deduct 1 from the result of step (4) before placing it in the appropriate POKE 7,00 statement. Go to step (5) before repeating step (3).
 (5) Replace the PRINT PEEK (185) command with the original program statement and return to step (3) if required.

Remember, you don't need to keep track of 'return' address as Superskip is already equipped to deal with this.



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Commodore 64 Fast Sprites

by Edward Carroll

'Fast Sprites' is an extremely useful machine code routine for the '64.

Although sprites are an extremely useful feature, it is difficult to control more than one or two at a time if they are moving in different directions and speeds. Not only do the loops become complicated, but Basic is very slow when it comes to graphics handling. What Fast Sprites does is to take the hard work out of moving sprites around the screen.

The program allows up to eight sprites (the maximum allowed by the '64) to move continuously and independently around the screen. For each sprite, you are required to enter six parameters:

- x Speed and direction,
- y Speed and direction,
- x Minimum position,
- y Minimum position,

- x Maximum position,
- y Maximum position.

These parameters are stored in location 700-755. Locations 700-715 are the speed and direction of the sprites. The speed is a number between 1 and 127 and direction backwards, rather than forwards, is obtained by adding 128 to the speed value.

700 = x speed/direction of sprite 0
 701 = y speed/direction of sprite 0
 714 = x speed/direction of sprite 7
 715 = y speed/direction of sprite 7

Setting any of these locations to a 0 will stop movement of the relevant sprite in the appropriate direction. Locations 720-735 are the minimum x and y positions that a sprite can have. When the x or y coordinate of a sprite equals its corresponding minimum coordinate; its direction will be reversed.

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PROGRAMS

- 720 = Minimum x position of sprite 0
- 721 = Minimum y position of sprite 0
- 734 = Minimum x position of sprite 7
- 735 = Minimum y position of sprite 7

Locations 740 - 755 are the maximum positions the sprites can have. When the x or y coordinate of a sprite equals its corresponding maximum coordinate, the sprite direction is reversed. For the maximum x position, 256 must be added to the value to get the true maximum position. For example, a value of 64 equals a maximum x position of 320 (64+256)

- 740 = Maximum x position of sprite 0
- 741 = Maximum y position of sprite 0

- 754 = Maximum x position of sprite 7
- 755 = Maximum y position of sprite 7

As well as the location just mentioned, two other locations are used by the routine. Location 1023 controls the over-all speed of the sprites movement. 1 = fastest, 255 = slowest. When POKing this location, location 2 should be POKed with the same value or a delay may occur between the change of speed.

Location 254 controls whether the interrupt routine updates the sprite positions or not. An 0 here enables the routine while a 1 disables the routine and lets the sprite be used as normal.

```

● 10 PRINT"[CLS]          READING MACHINE-CODE"
20 FORT=0T01:CH=0:FORB=0T015:READH:CH=CH+H:POKE49152+T*16+B,H:NEXT:READH
30 IFK>(CHAND255)THENPRINT"[CLS]TYPING ERROR IN LINE"PEEK(43)+254+PEEK(64):END
40 SU=SU+CH:NEXT:IFSU>24741THENPRINT"[CLS]TYPING ERROR IN LINES 1000-1110":END
50 PRINT"[CLS]START ROUTINE BY 'BYS 49152'."
60 PRINT"ENABLE BY 'POKE 254,0'"
70 PRINT"DISABLE BY 'POKE 254,1'"
80 END
999 :
● 999 REM ***** MACHINE-CODE DATA *****
999 :
1000 DATA120,169,192,141,21,3,169,13,141,20,3,88,96,165,254,208,11
1010 DATA4,198,2,240,3,76,49,234,173,255,3,133,2,32,35,192,95
1020 DATA76,49,234,162,0,138,74,168,189,188,2,41,127,240,110,189,195
1030 DATA188,2,48,81,133,252,254,0,208,208,9,173,14,208,25,164,147
1040 DATA192,141,16,208,189,0,208,221,228,2,144,20,138,74,176,8,173
1050 DATA173,16,208,57,164,192,240,8,189,188,2,9,128,157,188,2,129
1060 DATA198,252,208,210,76,157,192,41,127,133,252,222,0,208,189,0,161
1070 DATA208,201,255,208,11,173,16,208,57,172,192,141,16,208,169,255,186
1080 DATA221,208,2,176,20,138,74,176,8,173,16,208,57,164,192,208,249
1090 DATA8,189,188,2,41,127,157,188,2,198,252,208,204,252,224,16,190
1100 DATA208,131,96,234,1,2,4,8,16,32,64,128,254,253,281,247,137
1110 DATA239,223,191,127,13,13,251,255,0,0,255,255,0,0,255,255,28

```

A short demonstration program showing how to use Fast Sprites

```

● 0 REM THIS PROGRAM DEMONSTRATES HOW A SPRITE MAY BE MOVED AROUND THE
1 REM SCREEN INDEPENDANTLY OF ANY PROGRAM WHICH MAY BE RUNNING. OF COURSE,
2 REM THE MACHINE-CODE LOADER PROGRAM SHOULD BE RUN FIRST.
10 BY849152:          REM START ROUTINE
20 POKE254,1:        REM DISABLE INTERRUPTS
30 V=4096+13:        REM VIDEO CHIP
40 FORT=832T0895:POKET,255:NEXT:  REM DEFINE SPRITE
50 POKE2040,13:POKEV+39,1:POKEV+21,1:REM SET POINTERS
60 POKEV,24:POKEV+1,50:  REM SET SPRITE POSITION
70 POKE1023,2:POKE2,2:  REM SET OVERALL SPEED
80 POKE700,2:POKE701,1:  REM SET X/Y SPEEDS
90 POKE720,24:POKE721,50:  REM SET X/Y MINIMUM POSITIONS
100 POKE740,320AND255:POKE741,229:  REM SET X/Y MAXIMUM POSITIONS
110 POKE254,0:        REM ENABLE INTERRUPTS AND START SPRITE

```



IBM Sheepdog Trials

by Chris Gray

I've been wanting to publish a game for the IBMPC for some time. Actually, I've been secretly hoping that someone would send me a game of Space Invaders for the PC; I mean, what's the point of having all those expensive electronics if you can't zap an alien or two in your lunchbreak? Ah, well, at least I can now try to round up sheep instead. This program is written in IBM BasicA.

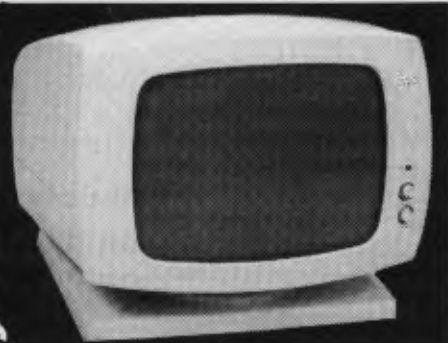
If you've never played the game, 'Sheepdog Trials' is more difficult than it sounds. The idea is that you control one blob (the sheepdog) while up to six other blobs (the sheep) wander around the screen. Your job is simply (!) to man-

oeuvre the sheep into the pen in the centre of the screen. The rules governing the movement of the sheep are as follows:—

- (a) If the dog is the correct distance from the sheep, the sheep will move away from the sheepdog.
- (b) If the dog is too far away, the sheep will move randomly.
- (c) If the dog is too near, the sheep will panic and scatter.
- (d) Sheep directed into the pen will escape if left unguarded for too long.
- (e) All other things being equal, the sheep will (as is their wont) tend to follow each other.

When you have got all the sheep into the

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PROGRAMS

pen, position yourself in the gate. You are awarded a score based on the time taken to round up all the sheep.

If you don't happen to have a PC handy, 'Sheepdog' is a fairly easy program to write, although this particular version uses two of IBM Basic's more esoteric features. LOCATE x, y positions the cursor at the specified point on the 80x25 screen. Similarly, SCREEN (x, y) returns the

ASCII value of the character at the specified position.

Lines 3110-40 check for a cursor-key press, checking cursor-down, -up, -left and -right respectively. CHR\$(2) (the dog) is a smiling face, CHR\$(227) is the pi sign which, with a bit of imagination, vaguely resembles a sheep. The other CHR\$s used are block graphics and line characters to draw the pen.

```

1 REM*****
2 REM**
3 REM** Sheepdog Trials Chris Gray Sept 1983 **
4 REM**
5 REM*****
6 REM
10 REM*****
20 REM**
30 REM** initial variables and set run conditions **
40 REM**
50 REM*****
60 KEY OFF
70 RANDOMIZE VAL (RIGHT$(TIME$,2))
80 CLS
90 LET SON = 0
100 INPUT "Do you want sound (Y/N)";Q$
110 IF Q$="Y" OR Q$="y" THEN LET SON = 1:GOTO 130
120 IF Q$<>"N" AND Q$<>"n" THEN PRINT "Invalid selection - ";:GOTO 90
130 INPUT "How many sheep (1-6)";NS
140 IF NS>6 OR NS<1 OR NS<>INT(NS) THEN PRINT "Invalid selection - ";:GOTO 130
150 LET SC=3000+NS*1000
160 DEF FN X = 1 + INT(RND*(80))
170 DEF FN Y = 1 + INT(RND*(22))
180 LET D$ = CHR$(2)
190 LET S$ = CHR$(227)
200 GOSUB 1000:REM set up screen
210 GOSUB 2000:REM position sheep & dog
300 REM*****
310 REM**
320 REM** mainline loop **
330 REM**
340 REM*****
350 FOR Z = 1 TO 10
360 GOSUB 3000:REM dog move
370 GOSUB 4000:REM score
380 NEXT Z
390 GOSUB 5000:REM sheep move
400 GOTO 300
410 STOP
900 REM*****
910 REM** subroutines *****
920 REM*****
930 REM
1000 REM*****
1010 REM**
1020 REM** set up screen **
1030 REM**
1040 REM*****
1050 CLS
1060 LOCATE 1,1
1070 PRINT STRING$(80,223);
1080 LOCATE 23,1
1090 PRINT STRING$(80,220);
1100 FOR N = 1 TO 23
1110 LOCATE N,1
1120 PRINT CHR$(222);
1130 LOCATE N,80
1140 PRINT CHR$(221);
1150 NEXT N
1160 LOCATE 10,37
1170 PRINT CHR$(201);CHR$(184);" ";CHR$(213);CHR$(187);
1180 LOCATE 11,37
1190 PRINT CHR$(185);" ";CHR$(204);
1200 LOCATE 12,37
1210 PRINT CHR$(185);" ";CHR$(204);
1220 LOCATE 13,37
1230 PRINT CHR$(200);CHR$(205);CHR$(205);CHR$(205);CHR$(188);
1240 LOCATE 24,30
1250 PRINT "SCORE ";SC;
1260 RETURN
2000 REM*****
2010 REM**
2020 REM** set up dog and sheep on screen **
2030 REM**
2040 REM*****
2050 FOR N = 1 TO NS
2060 READ X(N)
2070 READ Y(N)
2080 LOCATE Y(N),X(N)
2090 PRINT S$;
2100 NEXT N
2110 DATA 9,17,8,18,9,18,10,18,9,19,10,19
2120 LET XD = FN X
2130 LET YD = FN Y
2140 IF SCREEN(YD,XD) <> 32 THEN GOTO 2120

```

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PROGRAMS

```

2150 LOCATE YD,XD
2160 PRINT D$;
2170 RETURN
3000 REM*****
3010 REM** **
3020 REM** dog (player) movement **
3030 REM** **
3040 REM*****
3050 LET EX=0
3060 LET EY=0
3070 LET K$=INKEY$
3080 IF K$ = "" THEN GOTO 3170
3090 IF LEFT$(K$,1) <> CHR$(0) THEN GOTO 3170
3100 LET K$ = RIGHT$(K$,1)
3110 IF K$ = CHR$(72) THEN LET EY = -1;LET EX = 0;GOTO 3160
3120 IF K$ = CHR$(80) THEN LET EY = +1;LET EX = 0;GOTO 3160
3130 IF K$ = CHR$(75) THEN LET EX = -1;LET EY = 0;GOTO 3160
3140 IF K$ = CHR$(77) THEN LET EX = +1;LET EY = 0;GOTO 3160
3150 GOTO 3170
3160 IF SDN THEN SOUND 999,.1
3170 DEF SEG=0
3180 POKE 1050,PEEK(1052)
3190 IF SCREEN (YD+EY,XD+EX) <> 32 THEN GOTO 3270
3200 LOCATE YD,XD
3210 PRINT " ";
3220 LET XD=XD+EX
3230 LET YD=YD+EY
3240 LOCATE YD,XD
3250 PRINT D$;
3260 IF XD=39 AND YD = 10 THEN GOTO 6000
3270 RETURN
4000 REM*****
4010 REM** **
4020 REM** calculate current score and display **
4030 REM** **
4040 REM*****
4050 LET SC = SC - 2
4060 IF SC <= 0 THEN SC=0;GOTO 6110
4070 LOCATE 24,36
4080 PRINT SC;
4090 RETURN
5000 REM*****
5010 REM** **
5020 REM** move all the sheep **
5030 REM** **
5040 REM*****
5050 XDEF = INT(RND*3)-1
5060 YDEF = INT(RND*3)-1
5070 FOR N = 1 TO NS
5080 LET XABS = ABS(X(N) - XD)
5090 LET YABS=ABS(Y(N)-YD)
5100 IF XABS < 2 AND YABS < 2 THEN DX = XDEF;DY = YDEF;GOTO 5140
5110 IF XABS > 16 OR YABS > 8 THEN DX = XDEF;DY = YDEF;GOTO 5140
5120 LET DX = SGN(X(N) - XD)
5130 LET DY=SGN(Y(N)-YD)
5140 IF SCREEN(Y(N)+DY,X(N)+DX)<>32 THEN GOTO 5250
5150 IF X(N)+DX=2 OR X(N)+DX=79 OR Y(N)+DY=2 OR Y(N)+DY=22 THEN GOTO 5250
5160 LOCATE Y(N),X(N)
5170 PRINT " ";
5180 LET X(N) = X(N)+DX
5190 LET Y(N)=Y(N)+DY
5200 LET XDEF=DX
5210 LET YDEF=DY
5220 LOCATE Y(N),X(N)
5230 PRINT S$;
5240 GOSUB 3000:REM dog move
5250 NEXT N
5260 RETURN
6000 REM*****
6010 REM** **
6020 REM** check for all the sheep in the pen **
6030 REM** **
6040 REM*****
6050 FOR N = 1 TO NS
6060 IF Y(N)<11 OR Y(N)>12 OR X(N)<39 OR X(N)>40 THEN GOTO 6270
6070 NEXT N
6080 IF SDN THEN FOR M=4 TO 6:FOR N=1 TO 3:PLAY "L640=m:cdefgab":NEXT:NEXT
6090 PRINT
6100 LOCATE 24,10
6110 PRINT "You scored ";SC;" Another game (Y/N)";
6120 INPUT Q$
6130 IF Q$ = "Y" OR Q$ = "y" THEN RUN
6140 IF Q$ = "N" OR Q$ = "n" THEN KEY ON:END
6150 PRINT "Invalid selection - ":GOTO 6100
6160 GOTO 6100

```



VIC-20 Vlist

'Vlist' is a simple machine code utility for the unexpanded VIC-20. It provides a list of all variables used within a Basic program. Vlist will also run on an expanded machine without modification.

Once the listing below has been typed in, it should be saved before running. After

running the program, you can delete it using NEW. The machine code is located at the top of RAM and the pointers reset to protect it. The utility is now available as a system command, VLIST.

By way of a demonstration, you can VLIST Vlist before you delete it.

PROGRAMS

```

100 READ N
110 P = PEEK(55) - N
120 IF P < 0 THEN P = P + 255 : POKE 56 , PEEK(56) - 1
130 POKE 55 , P : CLR
140 READ N , N1 :PRINT CHR$(147)"LOADING ... "
150 BEGIN = PEEK(56) * 256 + PEEK(55) - N1
160 READ P : PRINT"*";
170 IF P > 255 THEN GOSUB 240
175 IF P < 0 THEN GOSUB 300
180 POKE BEGIN + COUNT , P
190 COUNT = COUNT + 1
200 IF COUNT < N + N1 THEN 160
210 PRINT CHR$(147)"ULIST READY."
220 SYS BEGIN:END
230 REM ***** SUBROUTINES *****
240 READ Q : COUNT = COUNT + 1
250 P = P + BEGIN : C = - 1
260 IF P > 255 THEN P = P - 256 : C = C + 1 : GOTO 260
270 Q = Q + C
280 POKE BEGIN + COUNT - 1 , P
290 P = Q : RETURN
300 IF T = 1 THEN 350
310 P = P + BEGIN + 255
320 T = 1
330 IF P > 255 THEN P = P - 256 : TCOUNT = TCOUNT + 1 : GOTO 330
340 RETURN
350 P = P + TCOUNT + 255 : RETURN
390 REM ***** DATA *****
400 DATA 223,18
410 DATA 169,76,133,117,169,-237,133,118,169,-255,133,119,169,234
420 DATA 133,120,96,234,208,2,230,123,72,138,72,152,72,160,255,200
430 DATA 185,491,0,240,5,217,0,2,240,245,192,5,208,20,32,328,0
440 DATA 165,122,24,105,4,144,2,230,123,133,122,169,58,160,0,145
450 DATA 122,104,168,104,170,104,76,121,0,162,00,134,253,32,355,0
460 DATA 165,45,133,254,165,46,133,255,165,255,197,48,144,18,165
470 DATA 254,197,47,144,12,189,476,0,8,32,210,255,232,40,208,245
480 DATA 96,138,72,56,32,240,255,164,253,230,253,185,471,0,168
490 DATA 201,16,208,26,160,0,132,253,232,224,20,208,17,162,0,165
500 DATA 198,240,252,169,0,133,253,133,198,169,147,32,210,255,24
510 DATA 32,240,255,104,170,160,00,177,254,41,127,32,210,255,200
520 DATA 177,254,72,41,127,32,210,255,104,41,128,240,13,136,177
530 DATA 254,41,128,8,169,36,40,240,2,169,37,32,210,255,165,254
540 DATA 24,105,7,133,254,144,2,230,255,160,0,240,128,0,5,10,15
550 DATA 16,147,46,86,76,73,83,84,13,0,13,46,69,78,68,0,86,76,73
560 DATA 83,84,0
READY.

```



Lower CLS

by M Leaver

M Leaver's utility for the Sinclair Spectrum is a machine code routine for clearing the lower third of the screen. This allows users to write programs, to draw graphics pictures, and then use the lower part of the screen for text.

The machine code routine (printed here) could be altered and then used to clear other sections of the screen, or fill sections with characters. Try experimenting with different techniques.

```

5B04 21 00 50 LD HL,$5000H
5B07 01 00 08 LD BC,$0800H
L: 5BOA 3E 00 LDA,$0
5BOC 77 LD(HL),A
5BOD 23 INC HL
5BOE 0B DEC BC
tBOF 78 LD A,B
5B10 B1 OR C
5B11 20 7F JR NZ F7
5B13 C9 RET

```

The position in the display file of the beginning of the section to be blanked is placed in the HL registers at the beginning of the routine, and the number of places in the section is placed in the BC register pair. The character to be placed in the file is then put into the accumulator and the program is repeated from the L label (where the accumulator is loaded with zero) until BC reaches zero. Detecting when BC is zero, since no flags are set on the 16-bit register decrements, is done by taking the contents of B and O Ring them with C. If both are zero, i.e. BC is zero, then the result of the OR will be zero.

Note that lines 5 to 30 and lines 9130 to 9100 are unnecessary to the routine itself: they are just there to give a demonstration of where the screen is cleared.

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PROGRAMS

```

5 PAPER 7: INK 0
10 PLS
11 PLOT 98,50: DRAW 60,0,-PI
12 PLOT 0,50: DRAW 255,0
13 PLOT 68,50: DRAW 30,0,PI
14 PLOT 150,50: DRAW 30,0,PI
15 PLOT 120,00: DRAW 30,0,PI
16 PLOT 120,00: DRAW 15,0,PI
17 PLOT 120,00: DRAW 0,0
20 PLOT 120,50: DRAW 0,-18: DR
AU 16,0,PI: DRAW 0,18
21 PLOT 120,65: DRAW 1,0: PLOT
145,65: DRAW 1,0
22 PAUSE 100: INK 0
23 PRINT AT 7,0:"NOT NO LOWER
THIRD ?"
30 PRINT AT 10,0:"Yes, anything
0 below line 10"on the screen
will vanish" immediately a key
is pressed": PAUSE 0
9100 RESTORE : FOR A=20000 TO 20
015: READ 3: POKE 3,3: NEXT A
9110 DATA 30,0,00,1,0,0,00,0,119
,35,11,120,177,00,247,201
9120 RANDOMIZE USA 200000
9130 PLOT 110,65: DRAW 6,0,-PI:
PLOT 143,65: DRAW 9,0,-PI
9200 PRINT AT 10,0:"This is a sm
all subroutine which is useful
for drawings etc."required to
remain on screen"while a runn
ing text is executed": PAUSE 0:
RANDOMIZE USA 20000: GO TO 30
    
```

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Commodore 64 Monitor

From Martin Lightfoot comes a useful little program for the 64. Anyone who owns or used to own a PET computer will recognise the style of this machine code monitor. This kind of program used to come with the PET but was dropped on the VIC and 64.

This program makes up for the loss by allowing you to edit, move, save, list and examine machine code in hexadecimal (hex is a method of counting using base

16 instead of 10 as in decimal). Included in the program is a help menu, accessed by the up-arrow command. This table gives the details of each command. A few of these may need clarification so here goes . . .

To edit the memory, just list it to the screen with the D command. Then move the cursor up to the required position on the screen and edit the data. Note that the numbers are in hex and that each one

needs two digits. When you've finished editing, press return and the data between the beginning of the line and the cursor position will be POKEd into memory.

When listing with the D option, the F1 key can be used to return you to command mode. If, at any time, you make a mistake, a question mark will be placed in the left-hand column where the error occurred.

```

5 POKE51,0:POKE52,159:POKE55,0:POKE56,159:CLR
10 REM*****
11 REM DATA FOR MACHINE CODE 'FILL'
12 REM*****
15 DATA160,0,165,2,145,251,230,251,208,2,230,252,165,251,197
16 DATA253,208,240,165,252,197,254,208,234,165,2,145,253,96
17 FORG=40710T040738:READA:POKEG,A:NEXT
20 REM*****
21 REM DATA FOR MACHINE CODE 'MOVE'
22 REM*****
25 DATA160,0,177,251,145,253,230,251,208,2,230,252,230,253,208,2
26 DATA230,254,165,251,205,52,3,208,233,165,252,205,
53,3,208,226,96
27 FORG=40740T040772:READA:POKEG,A:NEXT
100 DEFFNHEX(X)=(XAND15)+48-((XAND15)>9)*7
110 DEFFNDEC(X)=X-48+(X>57)*7
120 POKE53280,12:POKE53281,0
130 PRINT"  MACHINE CODE MONITOR - MARTIN LIGHTFOOT "
190 OPEN1,0
200 PRINT"  ":INPUT#1,C0$:IFC0$=""THEN200
205 IFC0$="↑"THEN6000
210 L$=LEFT$(C0$,1)
220 IFL$="D"THEN1000
230 IFL$="S"THEN2000
240 IFL$="L"THEN3000
250 IFL$="."THEN4000
260 IFL$="G"THEN800
270 IFL$=";"THEN5100
280 IFL$="F"THEN4500
290 IFL$="M"THEN4600
300 IFC0$="R"THEN5000
310 IFC0$="X"THENPOKE53280,14:POKE53281,6:PRINT"  ":END
500 PRINT:PRINT"  ?  ":GOTO200
600 REM*****
601 REM CONVERT HEX TO DECIMAL
602 REM*****
605 H=0
610 FORX=1TOLEN(H$)
620 T=FNDEC(ASC(MID$(H$,X,1))):H=H*16+T
630 IFT>16-10RT<0THENER=1
    
```

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PROGRAMS

```
640 NEXT
650 IFER=1THENER=0:H=-1
660 RETURN
700 REM*****
701 REM    CONVERT DECIMAL TO HEX
702 REM*****
705 T=H:H$=""
710 H$=CHR$(FNHEX(T-INT(T/16)*16))+H$:T=INT(T/16)
715 IFT>0THEN710
720 RETURN
800 REM*****
801 REM EXECUTE MACHINE CODE PROGRAM
802 REM*****
805 IFMID$(CO$,2,1)<>" "THEN500
810 IFLEN(CO$)<>6THEN500
820 H$=RIGHT$(CO$,4):GOSUB600:IFH=-1THEN500
830 SYSH:GOTO200
1000 REM*****
1001 REM    DISPLAY MEMORY ON SCREEN
1002 REM*****
1005 IFLEN(CO$)<>11THEN500
1010 IFMID$(CO$,2,1)<>" "THEN500
1020 CO$=RIGHT$(CO$,9):H1$=""
1025 IFMID$(CO$,5,1)<>"."THEN500
1030 H1$=LEFT$(CO$,4)
1040 H2$=RIGHT$(CO$,4)
1110 H$=H1$:GOSUB600:IFH=-1THEN500
1120 A1=H
1130 H$=H2$:GOSUB600:IFH=-1THEN500
1140 A2=H
1150 IFA2<=A1THEN500
1155 PRINT:PRINT
1160 FORJ=A1TOA2STEP8
1170 H=J:GOSUB700:PRINT"J."H$"█":I=0
1180 H=PEEK(J+I):GOSUB700
1185 IFLEN(H$)=1THENMH$="0"+H$
1190 PRINT" "H$:GETR$:IFR$="█"THENJ=A2:GOTO1210
1200 I=I+1:IFI<8THEN1180
1210 PRINT:NEXTJ
1220 GOTO200
2000 REM*****
2001 REM    MEMORY SAVE ROUTINE
2002 REM*****
2003 SS=0
2005 NA$="":IFMID$(CO$,2,1)<>CHR$(34)THEN500
2010 CO$=RIGHT$(CO$,LEN(CO$)-2)
2020 FORG=1TOLEN(CO$)
2030 IFMID$(CO$,G,1)=CHR$(34)THENF=G:G=LEN(CO$):
    GOTO2050
2040 NA$=NA$+MID$(CO$,G,1)
2050 NEXT
2060 IFSS=1THEN3010
2070 CO$=RIGHT$(CO$,LEN(CO$)-F):IFLEN(CO$)<>10THEN500
2080 IFLEFT$(CO$,1)<>"."THEN500
```



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PROGRAMS

```
2085 IFMID$(C0$,6,1) <> ". " THEN 500
2090 H$=MID$(C0$,2,4):GOSUB600:IFH=-1THEN500
2095 SA=H
2100 H$=RIGHT$(C0$,4):GOSUB600:IFH=-1THEN600
2110 EA=H
2120 IFEAC=SATHEN500
2130 PRINT:PRINT:OPEN2,1,1,NA$:PRINT#2,SA:PRINT#2,EA
2140 FORS=SATOEA:PRINT#2,PEEK(S):NEXT:CLOSE2:GOTO200
3000 REM*****
3001 REM MEMORY LOAD ROUTINE
3002 REM*****
3003 IFC0$="L" THEN NA$="":GOTO3010
3005 SS=1:GOTO2005
3010 PRINT:OPEN2,1,0,NA$
3020 INPUT#2,SA,EA
3030 FORG=SATOEA:INPUT#2,A:POKEG,A:NEXT:CLOSE2:GOTO200
4000 REM*****
4001 REM MEMORY MODIFY ROUTINE
4002 REM*****
4005 IFLEN(C0$) <> 29 THEN 500
4010 AD$=MID$(C0$,2,4)
4020 H$=AD$:GOSUB600:IFH=-1THEN500
4030 AD=H:FORG=6T027STEP3:IFMID$(C0$,G,1) <> ". " THEN ER=1:G=27
4040 NEXT
4050 IFER=1 THEN ER=0:GOTO500
4060 C0$=RIGHT$(C0$,23)
4070 FORG=1T023STEP3:H$=MID$(C0$,G,2):GOSUB600:IFH=-1THEN500
4080 POKEAD,H:AD=AD+1:NEXT
4090 GOTO200
4500 REM*****
4501 REM MACHINE CODE 'FILL' ROUTINE
4502 REM*****
4510 D=2:SS=0:IFLEN(C0$) <> 14 THEN 500
4520 IFMID$(C0$,2,1) <> ". " OR MID$(C0$,7,1) <> ". "
OR MID$(C0$,12,1) <> ". " THEN 500
4525 H$=MID$(C0$,3,4):GOSUB600:IFH=-1THEN500
4530 A1=H:H$=MID$(C0$,8,4):GOSUB600:IFH=-1THEN500
4540 A2=H:H$=RIGHT$(C0$,D):GOSUB600:IFH=-1THEN500
4542 IFSS=1 THEN 4610
4545 IFA2<A1 THEN 500
4550 IFA1=A2 THEN POKEA1,H:GOTO200
4560 POKE252,INT(A1/256):POKE251,A1-256*PEEK(252)
4570 POKE254,INT(A2/256):POKE253,A2-256*PEEK(254)
4580 POKE2,H:SYS40710:GOTO200
4600 REM*****
4601 REM MACHINE CODE 'MOVE' ROUTINE
4602 REM*****
4605 D=4:SS=1:IFLEN(C0$) <> 16 THEN 500
4606 GOTO4520
4610 IFA2<=A1 OR (HC=A2 AND H)=A1 THEN 500
4620 POKE252,INT(A1/256):POKE251,A1-256*PEEK(252)
4630 A2=A2+1:POKE821,INT(A2/256):POKE820,A2-256*PEEK(821)
4640 POKE254,INT(H/256):POKE253,H-256*PEEK(254)
4650 SYS40740:GOTO200
5000 REM*****
5001 REM RETURN VALUES IN REGISTERS
5002 REM*****
5010 PRINT"REGISTERS:-"
5020 PRINT"SP = ";H=PEEK(700):GOSUB700:PRINTH$
```

PROGRAMS

```

5030 PRINT "X = "; H=PEEK(781):GOSUB700:PRINTH#
5040 PRINT "Y = "; H=PEEK(782):GOSUB700:PRINTH#
5050 GOTO200
5100 REM*****
5101 REM ALTER VALUES IN REGISTERS
5102 REM*****
5105 IFLEN(CO#) <> 5 THEN 500
5110 Z=0:N# = MID$(CO#,2,1)
5120 IFN#="A" THEN Z=780
5130 IFN#="X" THEN Z=781
5140 IFN#="Y" THEN Z=782
5150 IFZ=0 THEN 500
5160 H# = RIGHT$(CO#,2):GOSUB600:IFH=-1 THEN 500
5170 POKEZ,H:PRINT:GOTO200
6000 REM*****
6001 REM DISPLAY SYNTAX FOR COMMANDS
6002 REM*****
6004 PRINT:PRINT" D AAAA.BBBB - DISLAY MEM"
6005 PRINT" M AAAA.BBBB.CCCC - MOVE MEM"
6010 PRINT" F AAAA.BBBB.CC - FILL MEM"
6015 PRINT" G AAAA - RUN MEM"
6020 PRINT" S"CHR$(34)"FILE NAME"CHR$(34)".AAAA.BBBB - SAVE MEM"
6025 PRINT" L"CHR$(34)"FILE NAME"CHR$(34)" OR JUST L - LOAD MEM"
6030 PRINT" JA=AA OR X=AA OR Y=AA - ALTER REGS"
6035 PRINT" X"TAB(26)"- EXIT":PRINT" R"TAB(26)"- DISPLAY REGS"
6040 PRINT"NOTE- ALL SPACES AND FULL STOPS MUST BE INCLUDED AS ABOVE."
6050 PRINT"ALL NUMBERS MUST BE IN HEX AND OF THE LENGTH SHOWN."
6060 PRINT:GOTO200

```



City Defence

T Phoeng has produced an excellent game for the Oric.

City Defence is a version of the popular arcade game Missile Command. You are in charge of the missile defence system and you alone have to stop the attack. You do this by placing your missile-aiming sight in front of the incoming

attack flight paths and mark them for your missiles to fire at.

After your defence system has recharged, your missiles start firing and, hopefully, you can stop the incoming attack.

If you miss any of the attackers, they make a real mess of the city and after five

hits you will be forced to surrender and a major part of the city will be destroyed. The game is not as easy as it looks, and getting any score at all is difficult (I could not get anything on my first five goes), but keep trying, you may triumph in the end.

Programs Editor

```

10 HIMEM#97FF:PRINTCHR$(17)CHR$(6)
15 DIME(30):DIMF(30)
20 GOSUB2000:GOSUB1000
25 PAPER0:INK7
30 HIRES:PRINTCHR$(17):TS=0:TH=0:R=0
35 N#="HIGH SCORE:"+MID$(STR$(HS),2)
40 CURSET131,190,0:GOSUB750
45 CURSET10,170,0:FORA=1TO37:CHAR108,0,1:
CURMOV6,0,0:NEXT
50 N#="hijkkj jihkhijhjkijhk hikjijkhkj
ik":CURSET10,162,0:GOSUB750
55 K=0:R=R+1:S=R:IFS>8THENS=8
60 R1=INT(200/(S+4))
65 CURSET0,160,0:FILL17,1,INT(RND(1)*6+1)
70 CURSET45,180,0:FORA=1TO25
75 CHAR109,0,1:CURMOV6,0,0:NEXT
80 X=120:Y=50
85 M=0:SC=0:DH=0:MI=25
90 CURSET0,0,0:FILL160,1,INT(RND(1)*6+1)
95 FORA=0TO9:D(A)=0:NEXT

```

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PROGRAMS

```
100 FORA=0TO9
105 A(A)=INT(RND(1)*225+10)
110 B(A)=INT(RND(1)*200+20)
115 C(A)=INT((B(A)-A(A))/8+0.5)
120 NEXT
125 U=0:V=0:CURSETX,Y,3:CHAR43,0,1
130 MUSIC2,6,10,0:PLAY2,0,1,200
135 FORA=0TO9:CURSETA(A),0,3:DRAWC(A),20,1:NEXT
140 FORT=1TOR1:GOSUB150:NEXT
145 GOSUB250:GOTO300
150 K#=KEY#:I=X:J=Y
155 IFK#="" THEN200
160 IFK#="" THEN165ELSEM=ASC(K#)
165 IFM=8THENX=X-7:IFX=8THENX=225
170 IFM=9THENX=X+7:IFX=232THENX=15
175 IFM=10THENY=Y+5:IFY=155THENY=150
180 IFM=11THENY=Y-5:IFY=5THENY=10
185 IFMP=0THENCURSETI,J,3:CHAR43,0,2
190 MP=0:CURSETX,Y,3:CHAR43,0,2
195 RETURN
200 IFMI=0THENRETURN
205 MP=1:MI=MI-1
210 CURSETMI*6+45,180,0:CHAR109,0,0
215 IFMI=5THENCURSET0,180,3:FILL8,1,12
220 Z=Z+1:E(Z)=X:F(Z)=Y
225 CURSETX,Y,3:CHAR43,0,1:RETURN
250 IFZ=0THENRETURN
255 FORA=1TOZ
260 FORB=1TO2:CURSET120,160,3:DRAWE(A)-118,F(A)-157,2:NEXTB
265 MUSIC1,3,7,0:PLAY1,1,2,600
270 FORC=1TO0STEP-1
275 FORD=1TO7:CIRCLED,C:NEXTD,C,A
280 CURSETX,Y,3:CHAR43,0,1:MP=0
285 Z=0:K#=KEY#:RETURN
300 U=U+1:0=U*20
305 IFU<6ANDRND(1)>.95THENGOSUB600:IFDH+TH>4THEN415
310 FORA=0TO9
315 IFD(A)=1THEN335
320 P=A(A)+U*C(A)
325 IFFPOINT(P,0)=0THEND(A)=1:V=V+1:GOTO335
330 CURSETP,0,3:DRAWC(A),20,1
335 NEXT
340 IFV=10THEN400
345 IFU<7THEN140
350 FORA=0TO9
355 IFD(A)=1THEN370
360 CURSETA(A)+8*C(A),165,1:DH=DH+1
365 GOSUB700:WAIT10
370 NEXT
400 CURSET0,0,0:FILL160,1,0:CURSET0,0,0:FILL160,40,64
405 K=K+1:IFK=2THEN415
410 IFTH+DH<5THEN90
415 FORA=180TO187:CURSET12,A,0:DRAW200,0,0:NEXT
420 CLS:IFTH+DH>4THENPRINT"NO SURVIVALBONUS":GOTO445
425 PRINT:IFMI=0THEN440
430 SOUND1,234,0:FORA=1TOM1:PRINT"m":;PLAY1,0,1,100:WAIT10:NEXT
435 PRINT" x ";25;" = ";MI*25
440 PRINT"SURVIVAL BONUS: 250":;SC=MI*25+250
445 PLAY1,0,1,250:WAIT400:CLS
450 PRINT"ROUND ";R:PRINT"SCORE: ";SC
455 PRINT"DIRECT HITS: ";DH:;WAIT400
460 TS=TS+SC:TH=TH+DH:CLS
465 PRINT"TOTAL SCORE: ";TS
470 PRINT"TOTAL DIRECT HITS: ";TH
475 CURSET0,180,3:FILL8,1,8
```

PROGRAMS

```
480 WAIT400:IFTH<5THEN55
500 CURSET120,150,0:MUSIC2,3,5,0:PLAY2,2,2,10000
505 FORA=1TO40:CIRCLEA,1:NEXT
510 PLAY2,2,1,10000:FORA=40TO1STEP-1:CIRCLEA,0:NEXT
515 CURSET65,75,0:FILL8,1,12
520 IFTS>HSTHENHS=TS:N#="NEW HIGH SCORE":GOTO530
525 N#="GAME OVER"
530 CURSET75,75,0:GOSUB750
535 CURSET75,90,0:N#="ANOTHER TRY? Y/N":GOSUB750
540 GETA#:IFA#="Y"THEN30
545 IFA#<>"N"THEN540
550 TEXT:PRINTCHR#(6):END
600 ES=2:EX=INT(RND(1)*40+100):EY=0
605 CURSETEX,EY,3
610 IFES=1THENSOUND1,60,1:ES=2:GOTO620
615 ES=1:SOUND1,60,4:PLAY1,0,0,0
620 IFEX<XTHENDRAW-10,20,1:EX=EX-10:GOTO630

625 DRAW10,20,1:EX=EX+10
630 EY=EY+20:IFEY=160THENCURSETEX,165,3:GOSUB700~DH=DH+1:RETURN
635 FORT=1TO12:GOSUB150:NEXT
640 GOSUB250
645 IFPOINT(EX,EY)=-1THEN605
650 RETURN
700 MUSIC2,5,6,0:FORB=2TO1STEP-1
705 PLAY2,2,B,1000:FORC=1TO10
710 CIRCLEC,B-1:NEXTC,B
715 RETURN
750 FORA=1TOLEN(N#)
755 CHARASC(MID$(N#,A,1)),0,1
760 CURMOV6,0,0:NEXTA:RETURN
1000 CLS:PAPER7:INKS:FORA=1TO2
1005 PLOT1,A,10:PLOT12,A,"CITY DEFENCE":NEXT
1010 PLOT1,5,"STOP ENEMY-ATTACK ON THE CITY."
1015 PLOT1,8,"YOU HAVE 25 MISSILES EACH ATTACKROUND."
1020 PLOT1,11,"USE CURSOR CONTROL KEYS FOR CURSOR-"
1025 PLOT1,13,"MOVEMENT AND CURSET WITH SPACEBAR."
1030 PLOT1,16,"AFTER 5 OR MORE DIRECT HITS ON THE"
1035 PLOT1,18,"CITY, YOU ARE FORCED TO SURRENDER."
1040 PLOT1,25,"PRESS ANY KEY TO START."
1045 GETA#:RETURN
2000 FORA=46912TO46959
2005 READRC:POKEA,RC:NEXT:RETURN
2010 DATA12,12,28,28,28,28,28,28,0,0,6,6,31,31,31,31,0,12,12,12,15,
15,15,15
2020 DATA0,0,0,0,0,0,60,60,63,63,63,63,63,63,0,0,8,8,8,8,28,8,20,0
```



Tunes

by L E Daly

This program for a 16k MicroBee will be mainly of interest to those who play music by ear. If you know the fundamentals of music, but are unable to sight read music then this program will play the tune for you.

All you have to do is enter the notes and their length. It has full editing facilities in case an error is made during entry of the tune as well as the facility for saving the tune (as data) on tape for the future.

The data saving and loading routines may be of interest to others who are not musically inclined. The save routine starts at line 1220. Notice that there is also the facility to save more than one tune per tape per side. Line 1380 is a time delay between the header and the data. This delay is necessary to allow the program to fetch the number of notes from the header before getting into the data during the load routine.

The load routine starts at line 2500.

You will need a very reliable cassette for this exercise because the data saved are integers. This means that any errors can cause the program to stop with input still tied to the cassette. Further, integers coming from the cassette will then be treated as line numbers and can easily corrupt the program. If any data is missed due to faulty loading, the program will sit for ever and a day waiting for the next piece of data to arrive. "RESET" is your only avenue of escape in this case as the

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PROGRAMS

"BREAK" key is disabled very early in the program. (See line 160.)

Getting back to the program itself, full instructions are included in the listing,

with the maximum number of notes to any one tune set at 250 (line 180). You would require a lot more patience than I to enter any more than that number at

one sitting. Due to the fixed timing in the MicroBee, the tempo may not always be perfect, but will give you an idea of the tune.

```

00100 REM *****
00110 REM PROGRAM... "TUNES"...LED/820530
00120 REM *****
00130 REM
00140 DATA "A","A#","B","C","C#","D","D#","E","F","F#","G","G#"
00150 DATA "A1","A#1","B1","C1","C#1","D1","D#1","E1","F1","F#1","G1","G#1"
00160 POKE 140,1:REM DISABLE BREAK KEY
00170 POKE 257,1:REM LDCK IN CAPITALS
00180 DIM T(250),I(250),L(250),K(250)
00190 SPEED 50:LET V=1:X=0:S=1
00200 GOTO 810
00210 REM PLAY TUNE
00220 IF X=0 THEN PRINT "Sorry no TUNE to play!!":RETURN
00230 INPUT "Hit RETURN to start Tune ",P0$
00240 FOR E=1 TO 3
00250 PRINT " ANDA ",E,
00260 FOR O= 1 TO 200:NEXT O
00270 NEXT E
00280 FOR M=1 TO V
00290 FOR H=0 TO X-1
00300 PLAY T(H),L(H)*S
00310 NEXT H
00320 NEXT M
00330 SPEED 10
00340 CLS:RETURN
00350 REM ENTER THE NOTES OF THE TUNE MANUALLY
00360 CLS:PRINT:SPEED 10
00370 PRINT "Enter 'P,0' when all Tune entered "
00380 INPUT "Enter the Note and it's length (NOTE,LENGTH) ",N0$,Q
00390 IF N0$="" THEN RETURN
00400 GOSUB 430
00410 GOTO 380
00420 REM CHECK FOR VALID NOTE & CONVERT TO No. FOR PLAY STATEMENT
00430 IF Q=0 THEN PRINT "Sorry can't have ZERO length":PRINT CHR$(7):RETURN
00440 IF LEN(N0$)>1 THEN GOTO 490
00450 LET F=0
00460 RESTORE 140
00470 GOSUB 540
00480 RETURN
00490 IF LEN(N0$)>2 THEN GOTO 510
00500 IF SEARCH(N0$,"#")=2 THEN GOTO 450
00510 LET F=12
00520 RESTORE 150
00530 GOTO 470
00540 IF N0$="R" THEN LET T(X)=0:GOTO 620
00550 FOR Z=1 TO 12
00560 READ A$
00570 IF A$=N0$ THEN LET T(X)=Z+F:NEXT Z 620
00580 NEXT Z
00590 PRINT "Sorry don't know that Note...RE-ENTER PLEASE":PRINT CHR$(7)
00600 LET Q=0
00610 RETURN
00620 LET L(X)=Q
00630 LET X=X+1
00640 RETURN
00650 REM LOAD A PREVIOUSLY SAVED TUNE FROM CASSETTE
00660 CLS:SPEED 60
00670 INPUT "Do you want to see the rules for Tune Titles? (Y/N) ",E0$
00680 IF E0$="Y" THEN GOSUB 2410
00690 PRINT
00700 INPUT "What is the name of the Tune you wish to load ",W0$
00710 GOSUB 2780:REM CONVERT TITLE TO STANDARD USED ON TAPE
00720 GOSUB 2550:REM LOAD TUNE FROM CASSETTE
00730 FOR H=0 TO G
00740 LET T(H)=I(H)
00750 LET L(H)=K(H)
00760 NEXT H
00770 LET X=G+1
00780 PRINT W0$(,5,10):" loaded and ready to PLAY"
00790 FOR E= 1 TO 200:NEXT E
00800 SPEED 10:RETURN
00810 CLS
00820 PRINT
00830 PRINT SPC(8):UNDERLINE:PRINT "WHAT'S THAT TUNE":NORMAL
00840 PRINT SPC(4):"Can't sight read music ???"
00850 PRINT :PRINT SPC(4):"If you tell me the Notes in order and their length"
00860 PRINT SPC(4):"I will play the Tune for you."
00870 PRINT:UNDERLINE
00880 PRINT "Which of the following Options do you wish ?"
00890 PRINT " 1...INSTRUCTIONS on how to enter the Tune."
00900 PRINT " 2...ENTER the NOTES of the Tune."
00910 PRINT " 3...LOAD a previously saved Tune from Cassette."
00920 PRINT " 4...PLAY the Tune you have entered or loaded."
00930 PRINT " 5...Change the TEMPO of the Tune."
00940 PRINT " 6...Change the number of VERSES to be played."
00950 PRINT " 7...CORRECT some notes already entered."
00960 PRINT " 8...ADD notes to those already entered."
00970 PRINT " 9...DELETE some notes already entered."
00980 PRINT "10...SAVE a Tune on cassette for later."
00990 PRINT "11...TERMINATE this program."
01000 NORMAL
01010 PRINT "NO. OF VERSES=";V;" ITEMPO=";S;" ITOTAL NO. OF NOTES=";X
01020 INPUT "Option number please? ",Y
01030 ON Y GOSUB 1550,360,660,220,1060,1190,1770,1920,2190,1230,2860
01040 GOTO 870
01050 REM CHANGE TEMPO OF TUNE
01060 CLS
01070 PRINT "What Tempo would you like? "
01080 PRINT
01090 PRINT "1=Fast"
01100 PRINT "2=Moderate"
01110 PRINT "3=Moderately slow"
01120 PRINT "4=Slow"
01130 INPUT S
01140 IF S/4 THEN LET S=4
01150 IF S/1 THEN LET S=1
01160 CLS:SPEED 10
01170 RETURN
01180 REM CHANGE NO. OF TIMES TUNE IS PLAYED
01190 PRINT:INPUT "How many verses do you want ? ",V
01200 CLS:SPEED 10
01210 RETURN
01220 REM SAVE TUNE ON CASSETTE

```

```

01230 CLS:SPEED 60
01240 INPUT "Do you want to see the rules for Tune Titles? (Y/N) ",E0$
01250 IF E0$="Y" THEN GOSUB 2410
01260 PRINT "You may save more than one Tune per tape"
01270 INPUT "Do you wish to find the end of the tape first (Y/N)? ",E0$
01280 IF E0$="Y" THEN GOSUB 2520:REM FIND END OF LAST TUNE ON TAPE FIRST
01290 PRINT
01300 INPUT "What is the name of the Tune you wish to save? ",W0$
01310 GOSUB 2780:REM CONVERT TITLE TO STANDARD USED ON TAPE
01320 PRINT "Start cassette in 'RECORD' mode."
01330 INPUT "Hit RETURN to start the save. ",P0$
01340 PRINT "RECORDING IN PROGRESS, please DO NOT DISTURB."
01350 REM MAKE TAPE HEADER =****+6 CHARACTERS+****+No. OF NOTES+**
01360 LET W0$=W0$+STR(X-1)+"**"
01370 OUT#2:REM TO PRINT TO TAPE AT 300 BAUD
01380 PRINT:W0$
01390 LET J=0
01400 FOR E= 1 TO 300:NEXT E
01410 FOR H=0 TO X STEP 2
01420 PRINT T(H);";";L(H);";";T(H+1);";";L(H+1)
01430 OUT#0
01440 IF J=0 THEN LET J=1:PRINT " "; ELSE LET J=0:PRINT " ;"
01450 PRINT CHR$(8);
01460 OUT#2
01470 NEXT H
01480 OUT#0
01490 PLAY S,3;6,3;7,3
01500 PRINT
01510 PRINT "SAVE COMPLETED!...PLEASE STOP TAPE NOW!!!"
01520 FOR E=1 TO 150:NEXT E
01530 SPEED 50:RETURN
01540 REM GENERAL INSTRUCTIONS
01550 CLS:SPEED 80
01560 PRINT SPC(16);
01570 UNDERLINE:PRINT "INSTRUCTIONS":NORMAL
01580 PRINT
01590 PRINT " You simply enter the Notes in order, as they occur in the tune,"
01600 PRINT " and the length of the respective Note."
01610 PRINT "The Notes start at 'A' BELOW MIDDLE 'C' and go up 2 Octaves."
01620 PRINT "For Notes above 'G' ABOVE MIDDLE 'C'...."
01630 PRINT "Add the suffix '1' to the Note ";
01640 PRINT "(e.g. A1 or A#1 up to G#1)"
01650 PRINT "Enter 'R' for Rests. There are Sharps(#) but no Flats."
01660 PRINT "Let the length of the SHORTEST NOTE equal 1"
01670 PRINT "then all other notes are Multiples of this."
01680 PRINT "Enter 'P,0' when you have entered all the Notes."
01690 PRINT "Instructions for Saving and Loading Tunes from"
01700 PRINT "tape are included in the appropriate sections"
01710 PRINT "of the program."
01720 PRINT
01730 INPUT "Hit RETURN when ready to start. ",P0$
01740 CLS:SPEED 10
01750 RETURN
01760 REM CORRECT A FAULTY NOTE ALREADY ENTERED
01770 CLS:SPEED 60
01780 PRINT:PRINT "There are ";X;" notes in this Tune."
01790 PRINT "Count to the Note you wish to change"
01800 INPUT "What is the number of this Note? ",C
01810 INPUT "What is the new Note and it's Length (NOTE,LENGTH)? ",N0$,Q
01820 LET C=C-1
01830 LET J=X
01840 LET X=C
01850 GOSUB 430:REM CHECK FOR VALID NOTE AND CONVERT
01860 LET X=J
01870 IF Q=0 THEN LET C=C+1:GOTO 1810
01880 INPUT "Do you wish to change any other Notes ?(Y/N) ",E0$
01890 IF E0$="Y" THEN SPEED 10:GOTO 1780
01900 SPEED 10:RETURN
01910 REM ADD NOTES ANYWHERE IN THE TUNE
01920 CLS
01930 SPEED 40
01940 PRINT
01950 PRINT "There are ";X;" Notes in this Tune"
01960 PRINT "Count from start to the Note";
01970 INVERSE:PRINT " BEFORE ";NORMAL
01980 PRINT "the one you wish to insert."
01990 INPUT "What is the number of this Note? ",C
02000 INPUT "How many consecutive Notes do you wish to add? ",H
02010 LET C=C-1
02020 IF C>X-1 THEN LET C=X-1
02030 IF C=X-1 THEN GOTO 2080
02040 FOR F=X+1 TO C+H+1 STEP -1
02050 LET I(T(E))=T(E-H)
02060 LET L(E)=L(E-H)
02070 NEXT E
02080 LET J=X+H
02090 LET X=C+1
02100 FOR E=1 TO H
02110 INPUT "What is the new Note and it's Length (NOTE,LENGTH) ",N0$,Q
02120 GOSUB 430:REM CHECK FOR VALID NOTE AND CONVERT
02130 IF Q=0 THEN GOTO 2110
02140 NEXT E
02150 LET X=J
02160 CLS
02170 SPEED 10:RETURN
02180 REM DELETE NOTES THAT SHOULDN'T BE THERE
02190 CLS
02200 SPEED 60
02210 PRINT
02220 PRINT "There are ";X;" Notes in this Tune"
02230 PRINT "Count from the start to the first Note you wish to delete..."
02240 INPUT "What is the number of this Note? ",C
02250 INPUT "How many consecutive Notes do you wish to delete? ",H
02260 LET C=C-1
02270 IF C=X-1 THEN LET C=X-2
02280 FOR E=C TO X-H
02290 LET T(E)=T(E+H)
02300 LET L(E)=L(E+H)
02310 NEXT E
02320 LET J=X-H
02330 FOR E=J TO X-1
02340 LET T(E)=0

```



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PROGRAMS



```

02350 LET L(E)=0
02360 NEXT E
02370 LET X=J
02380 CLS
02390 SPEED 10
02400 RETURN
02410 UNDERLINE;PRINT "Rules governing Tune titles for saving on tape"
02420 NORMAL
02430 PRINT "1) Make TITLE=Main Word of Tune's title."
02440 PRINT " (i.e. drop any 'THE'S,'AND'S ETC.)"
02450 PRINT "2) Keep title to a maximum of SIX characters"
02460 PRINT " even if the word is not complete."
02470 PRINT "3) If you make the title longer than SIX characters"
02480 PRINT " (Including spaces) I will delete those characters"
02490 PRINT " which exceed SIX.":PRINT
02500 RETURN
02510 REM FIND THE LAST TUNE ON TAPE BEFORE SAVING CURRENT TUNE
02520 INPUT "What is the name of the LAST Tune on tape? ",W0$
02530 GOSUB 2780:REM CONVERT TITLE TO STANDARD USED ON TAPE
02540 REM TAPE READ ROUTINE
02550 PRINT "Start tape in PLAYBACK mode now please!"
02560 IN#2:OUT#0 OFF:REM INPUT FROM TAPE ONLY AT 300 BAUD
02570 INPUT B0$
02580 OUT#0:PRINT B0$(;5,10);
02590 OUT#0 OFF
02600 LET G=INT(VAL(B0$(;14)))
02610 LET J=0
02620 FOR M=0 TO G+1 STEP 2
02630 INPUT I(H),K(M),I(M+1),K(M+1)
02640 OUT#0
02650 IF J=0 THEN LET J=1:PRINT "X";ELSE LET J=0:PRINT " "
02660 PRINT CHR$(B);
02670 OUT#0 OFF
02680 NEXT M
02690 REM IF THIS TITLE IS NOT THE ONE REQUIRED THEN LOOK FURTHER
02700 IF B0$(;1,10)()W0$(;1,10) THEN OUT #0:PRINT:OUT #0 OFF:GOTO 2570
02710 IN#0:OUT#0
02720 PRINT
02730 PRINT "Stop Cassette now please. Tune is loaded."
02740 PLAY 5,3;6,3;7,3
02750 INPUT "Hit RETURN to continue",P0$
02760 RETURN
02770 REM MAKES TITLE= *****6 CHARACTERS*****
02780 IF LEN(W0$)<6 THEN LET D=6-LEN(W0$):GOSUB 2820
02790 LET W0$="*****"W0$(;1,6)+"*****"
02800 RETURN
02810 REM IF LEN(TITLE)<6 THEN FILL WITH *'S
02820 FOR M=1 TO D
02830 LET W0$=W0$+"*"
02840 NEXT M
02850 RETURN
02860 POKE 140,0:REM RESTORE BREAK KEY
02870 STOP

```

BLUDNERS

The gremlins really have surfaced this month, so bear with this rather subdued Bludners as we lick our wounds.

J Gondeniers advises us that in September '83's TJ's Workshop there was an error in the "TRS-80 Hex" program. Line 70 should read:

```
70 DATA 16788, 195, 64, 64
```

The 195 is decimal for C3 which is a JP instruction. Without this the original RET instruction at 4194 (Hex) would still operate and the "TRS-80 Hex" program would not be entered.

The December issue contained the incorrect phone number and address of Data Parts' Ballarat store. It should have been Mair Street (not Main Street) and the number is 31 3399 (not 31 3999). Also don't take any notice of the VIC-20 price in Data Parts' October advertisement. The quoted price of \$189 is wrong; it should of course be \$289.

The review of T/Maker III in the October issue of APC failed to mention the supplier of the review copy. Our apologies to Alfatron Pty Ltd and our thanks for the loan.

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